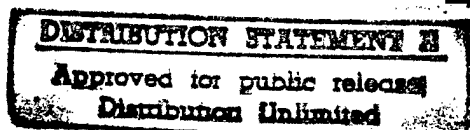
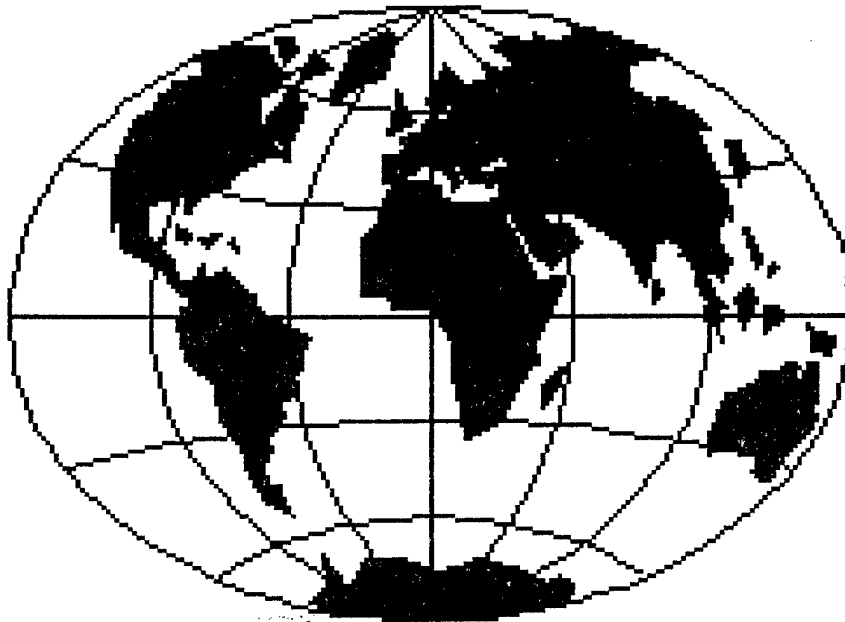


Analysis of the Tri-service Pollution Prevention Programs, Comparison of Characteristics, and Recommendations for Improvement



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PREFACE

Today's Military Departments face significant military and environmental challenges. The nature of military operations and industrial support for maintenance and manufacturing activities necessarily include use of some hazardous materials. These hazardous materials can increase cost and impose compliance obligations. The Department of Defense (DOD) Pollution Prevention Program has the objective of minimizing use of such materials and resulting hazardous wastes. In addition, the DOD Pollution Prevention Program has the objective of limiting the production and disposal of traditional wastes such as solid waste and airborne pollutants.

Pollution Prevention (P2) refers to the reduction, elimination, or recycling of pollutant discharges to the air, water, or land. The benefits of pollution prevention are numerous and include reduced health and ecological risks, and decreased operational costs. The Department of Defense recognizes the important role pollution prevention must play in the daily operation of the military and has established stringent standards for implementing a comprehensive P2 Program.

The purpose of this report is to analyze how DOD implements a pollution prevention program through the three military services, the Army, Navy (including Marine Corps), and Air Force. The report is divided into six chapters that are intended to provide the reader with a thorough understanding of the authority through which military activities implement a P2 Program, the organization through which these programs are implemented, and the functions and responsibilities of the elements within the organizations. The final chapter includes recommendations for improvement that can help strengthen the already solid DOD P2 Program. In addition, a glossary of terms and listing of acronyms is provided at the end of the report.

The information contained in this report came from a variety of sources including military instructions, guidance manuals, internet sites, and phone conversations with DOD environmental experts. An effort was made to include information that could give the reader a good background in each Service's P2 Program without providing so much information that the content becomes overwhelming. A listing of reference documents for each Service's P2 Program is provided in Chapter Five if the reader desires more detailed information.

As the military continues to down-size during the post Cold War era, efforts are being made to eliminate redundancies and emphasis is being put on conducting joint operations. This trend has not been limited to military operations but has also impacted how the three services implement their environmental programs. Efforts are currently underway to combine more conferences, training, guidance documents, etc. under one "purple" military umbrella to maximize use of manpower and other resources. The three P2 Program support organizations, the Army Environmental Center (AEC), Naval Facilities Engineering Service Center (NFESC), and Air Force Center for Environmental Excellence (AFCEE) are at the forefront of this movement of cooperation and unified purpose. They have already made significant strides in combining their resources to implement effective and efficient P2 Programs. An example of this cooperation is the sharing of information and lessons-learned that takes place at the annual Joint Service Pollution Prevention Conference.

Successful pollution prevention is a journey not a destination. In the spirit of Total Quality Management/Leadership, continuous efforts must be made to refine management practices, incorporate the latest technological advances, and comply with legislative and regulatory changes. The Department of Defense is committed to serving as a model organization for achieving compliance with environmental requirements by maintaining a high quality environmental program. Pollution Prevention is a key strategy within this program. It is DOD's sincere belief that an investment today in environmental sound technologies, equipment, and materials will produce a ready force, future savings, and environmentally responsible military operations.

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CHAPTER 1: Introduction to Pollution Prevention

Before analyzing how the Army, Navy (including Marines), and Air Force execute their Pollution Prevention (P2) Programs, it is important to explain some general concepts concerning pollution prevention. This chapter will illustrate what pollution prevention is and how successful P2 Programs are developed and implemented.

1.1 Pollution Prevention Defined

Pollution Prevention is defined as source reduction and other practices that reduce or eliminate the creation of pollutants through (1) increased efficiency in the use of raw materials, energy, water, or other resources or (2) protection of natural resources by conservation. In addition to being mandated by law, pollution prevention practices make good business sense, and are the ethical way to conduct operations. Benefits of preventing pollution in the workplace are numerous: decreased costs due to reduced waste and decreased releases; reduction in the procurement, management, and disposal of hazardous wastes; decreased future liabilities from waste disposal; a more healthful work environment; and improved public relations.

1.2 Pollution Prevention Hierarchy

Appendix 'A' (Figure 1.1) illustrates the concept of a pollution prevention hierarchy. The preferred method of reducing waste (both hazardous and non-hazardous) is at the source. Through modifications to a waste generating process, significant reductions can be made in the generation of undesirable by-products. Source reduction includes: changes to input materials and products, technology changes, and improved operating practices. Source reduction is the truest form of pollution prevention. The next most preferable method of pollution prevention is recycling. Recycling materials, products, and by-products on-site and reusing them in the original process or other processes is still classified as pollution prevention. Recycling a material, product, or by-product off-site is less preferred than on-site recycling and by definition is not pollution prevention. The term applied to off-site recycling is reclamation and

it is categorized as waste reduction by definition. The least preferred waste reduction option is treatment and disposal. Wastes can be treated in a variety of ways including physical, chemical, thermal, and biological processes. After treatment, remaining waste is sent to its ultimate disposal location.

1.3 Prevention of Hazardous Waste Generation

As discussed in the preceding section, pollution prevention involves reducing and on-site recycling both hazardous and non-hazardous wastes. For industrial activities, a strong emphasis is put on preventing and minimizing hazardous waste. This is because of the hazards associated with the waste, including flammability, corrosivity, reactivity, and toxicity, and the cost of hazardous waste treatment and disposal. Appendix 'B' (Figure 1.2) is a diagram of the processes through which hazardous materials are produced, transported, and utilized, and how hazardous wastes are generated, treated, and disposed of at an end repository. This diagram provides a succinct, visual representation of the complete life-cycle of a hazardous waste from creation to disposal. This entire process is surrounded by three envelopes which represent the protection of workers, the public, and the environment from the dangers associated with handling, treating, and disposing of the hazardous waste. To successfully minimize a particular hazardous waste stream, a comprehensive knowledge of the waste stream, from "cradle to grave" is required. The diagram in Appendix 'B' is provided to help describe and simplify how hazardous waste streams may be illustrated in a flowchart format.

The portion of the hazardous materials diagram of Appendix 'B' that can be influenced by a pollution prevention program is depicted in Appendix 'C' (Figure 1.3). It is in these processes that hazardous wastes can be minimized through source reduction and recycling. Only by thoroughly understanding the generation of hazardous wastes by an industrial activity can the appropriate waste minimization technologies and procedures be selected.

1.4 Development and Implementation of a P2 Program

Now that pollution prevention has been defined and the hazardous material/waste diagram has been introduced, the procedure for implementing a pollution prevention program at an activity will be discussed. This procedure is relatively generic and is certainly applicable to organizations outside the Department of Defense (DOD). Appendix

'D' (Figure 1.4) illustrates this procedure which is discussed in detail in "The Industrial Pollution Prevention Handbook" (Freeman, 1995). The following paragraphs will briefly delineate the main aspects of development and implementation of a P2 Program.

The first step in establishing a pollution prevention program is obtaining executive level support. This support is usually conveyed in a policy statement. After the policy statement is developed it should be presented to the workforce. Employee participation is essential for execution of a successful pollution prevention program. Typically, the second step is naming a pollution prevention task force. Members of the task force have the overall responsibility for developing the pollution prevention plan and directing its implementation. Specific goals should be established and progress should be monitored and evaluated with respect to these goals. These goals can be either qualitative, such as to "achieve a significant reduction of toxic substance emissions to the environment," or quantitative, which are more difficult to develop but worth the additional effort. Periodic review and refinement of the goals will help keep a pollution prevention program current, active, and visible.

The third step in establishing a P2 Program is performing a preliminary assessment. This step includes collection of data, review of installations and waste streams, and establishing priorities. Once information is obtained, a written program plan (step #4) can be developed. This written program plan should define program objectives, identify possible obstacles, and set up a schedule to meet program objectives. It is important to obtain feedback from the community and local regulators when drafting a written program. Steps four through eight include: performing a detailed assessment, screening pollution prevention options, conducting a feasibility analysis, and writing an assessment report.

The ninth step in establishing a P2 Program is implementation. All of the previous steps, regardless of how painstakingly they were undertaken, are meaningless without actual implementation. Implementation of the pollution prevention plan includes: selecting projects to be executed, obtaining funds for these projects, and installation of the selected projects. Step number ten is measuring progress against the goals. By reviewing the program's successes and failures, managers at all levels can assess the extent to which goals are being attained and compare those P2 techniques that are working with those that are not. The final step is maintaining the pollution prevention program by reviewing and adjusting program elements. The P2 process does not end with implementation. Knowledge that is gained during program implementation should be used to fine-tune and enhance pollution prevention projects. In

essence, there is no beginning or end to P2 Program development and execution. The process is a cycle that should continuously re-evaluate current efforts and make improvements where warranted.

1.5 Conclusion

Now that some basic concepts concerning pollution prevention have been established, a more specific analysis of the elements of the Department of Defense P2 Program can be discussed. Without a basic understanding of what pollution prevention is and how a program is implemented, the reader would be unable to completely understand the concepts presented in the remaining chapters. Chapter Two will present the laws and executive orders that have been passed that control how DOD executes its P2 Program. These laws and executive orders comprise the authority by which the DOD accomplishes its pollution prevention objectives.

CHAPTER 2: Program Authority

Chapter Two will discuss the laws and executive orders that are relevant to the execution of the Pollution Prevention Program within the Department of Defense (DOD). These pollution prevention-related laws and executive orders are applicable to nearly all agencies within the Federal Government. The Department of Defense is authorized to add additional requirements or publish further goals for meeting these laws and executive orders throughout DOD. Strategies, guidance, and instructions for complying with these laws and executive orders have been developed separately within each branch of the military service. An analysis of these strategies and instructions will be the focus of Chapter Five.

This chapter will begin by discussing laws relevant to pollution prevention. The two main laws that will be discussed are the Emergency Planning and Community Right-to-Know Act of 1986 and the Pollution Prevention Act of 1990. Additional laws that will be briefly presented include: the Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA), the Clean Water Act (CWA), the Toxic Substances Control Act (TSCA), and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). After presenting an overview of these laws, the executive orders that have direct influence over the implementation of the Department of Defense Pollution Prevention Program will be discussed.

LAWS

2.1 Emergency Planning and Community Right-to-Know Act (EPCRA)

In 1986, Congress passed the Emergency Planning and Community Right-to-Know Act (EPCRA). This legislation was passed to accomplish a variety of objectives related to the production and manufacture of toxic chemicals. Specifically, the Act requires facilities subject to EPCRA to inventory their chemicals, develop

emergency response plans, and coordinate with state and local officials to prepare for the accidental release of hazardous substances.

An additional purpose of EPCRA was to require companies to report annually to the Environmental Protection Agency (EPA) on the quantity of certain hazardous substances routinely discharged to the air, water and land by chemical manufacturers and processors. Facilities covered under EPCRA must report on an annual basis to a national data base known as the Toxics Release Inventory (TRI).

Since 1987, DOD facilities have been complying with the substantive emergency planning provisions of EPCRA. In August 1993, Executive Order 12856 was signed. This order required Federal Facilities to comply with the reporting provisions of EPCRA, as well.

Compliance with EPCRA presents a continuing challenge to those facilities subject to its planning and reporting requirements. Facilities subject to emergency planning provisions should actively participate in the local planning process as a matter of good community relations and to provide technical expertise to the Local Emergency Planning Committee (LEPC) (Sullivan, 1995). Facilities subject to the EPCRA reporting requirements need clearly written and rigorously implemented compliance plans and information management programs to avoid enforcement actions for noncompliance.

2.2 Pollution Prevention Act (PPA) of 1990

An additional requirement of Executive Order (EO) 12856 is that federal agencies were required to comply with the Pollution Prevention Act of 1990. This Act established a national policy that the method of choice in preventing pollution should be reducing pollution at its source. Before discussing the Pollution Prevention Act of 1990, it is important to understand the definitions of hazardous substances, pollution prevention and source reduction. Understanding these definitions is critical to fully comprehending what constitutes pollution prevention under the Pollution Prevention Act (PPA). These definitions are contained in the glossary of pollution prevention terms at the back of this report.

Congress responded to growing national concern with waste generation and management practices by enacting the Pollution Prevention Act of 1990 (42 U.S.C. §§13101-13109). In its findings, Congress stated that source reduction opportunities often went unexploited because of a variety of factors: existing regulations and industrial resources were focused on treatment and disposal, the applicable regulations did not require a multimedia approach to pollution prevention, and there was a lack of essential information on source reduction technologies that industry needed (Freeman, 1995). Congress went on, stating that "source reduction is fundamentally different and more desirable than waste management and pollution control (42 U.S.C. §13101(4))."

The EPA has been directed to develop a source reduction program and is the primary agency for implementing the provisions of the PPA. Under the PPA, the EPA was directed to create an office, the Office of Pollution Prevention at EPA Headquarters, Washington D.C., for developing, distributing, and implementing a comprehensive Pollution Prevention Strategy. Subsequently, the EPA issued its Pollution Prevention Strategy (56 *Fed. Reg.* 7649, February 1991) to clarify its mission and objectives. The strategy is designed to accomplish two primary goals: (1) to provide guidance and focus on current and future efforts to incorporate pollution prevention principles in existing EPA regulatory and non-regulatory programs, and (2) to set forth a program that will achieve specific pollution prevention objectives within a set, reasonable time-frame (EPA, 1991).

The PPA has five major provisions (sections 6604 to 6608) that address creating and implementing a national source reduction program. Section 6604 of the PPA establishes a comprehensive list of activities that the EPA Administrator must develop as part of a strategy to promote source reduction. Some of these activities are:

- Developing standardized methods of measuring source reduction
- Coordinating source reduction activities within EPA as well as other federal agencies
- Using the Source Reduction Clearinghouse and the state matching grant program, facilitate the adoption of source reduction programs by businesses
- Identifying measurable source reduction goals and a strategy to successfully implement those goals
- Developing source reduction auditing procedures to help identify source reduction opportunities in public and private sectors
- Identifying current barriers (regulatory, technological, policy) to achieving source reduction and recommending methods for overcoming these barriers to Congress
- Establishing source reduction training programs for all EPA program offices

Section 6605 of the PPA directs the EPA administrator to establish a matching grant program for states to promote the use of source reduction by industry and business. Under section 6606, the EPA Administrator is required to establish a computerized Source Reduction Clearinghouse to compile information on management, technical, and operational approaches to source reduction. Section 6607 requires each owner and operator of a facility that is required to comply with reporting requirements of SARA Sec. 313 (toxic chemical) to file an annual toxic chemical source reduction and recycling report with the EPA. This report must address the following:

- the quantity of chemical entering any waste stream
- the amount of any chemical that is recycled and the process used
- source reduction techniques associated with specific chemicals
- projected amounts of the chemicals that will be reported in the next two calendar years
- a comparison of chemical production figures from previous and current reporting years
- techniques used to identify source reduction opportunities
- the quantity of chemicals released as a result of one-time events (i.e. catastrophe, remediation, etc.)
- the quantity of chemicals that are treated during the reporting year, and comparison with previous years

Finally, in section 6608, the EPA must provide a biennial report to Congress that summarizes the data collected under section 6607. The report must also address the following:

- Data analysis on an industry-specific basis for a minimum of five Standard Industrial Codes (SICs), evaluating source reduction trends by industry, firm size, production, or other categories deemed appropriate by EPA
- Usefulness and validity of the data in measuring trends in source reduction, and the adoption of source reduction programs by businesses
- Identification of industries and pollutants that require assistance in multimedia source reduction
- Evaluation of the technical feasibility and associated costs of source reduction, and the identification of specific industries for which significant barriers to source reduction exist
- Opportunities to use existing regulations and programs to encourage source reduction
- Identification of incentives needed to encourage research and development in source reduction technologies as well as existing research opportunities

2.3 Other Federal Laws Impacting Pollution Prevention

Resource Conservation and Recovery Act (RCRA)

Under RCRA, an express objective is to minimize the generation of hazardous waste and the land disposal of hazardous waste by process substitution, materials recovery, recycling and reuse, and treatment. RCRA established a national policy that the reduction or elimination of hazardous waste generation should be achieved expeditiously. Specific actions required under RCRA include: (1) hazardous waste generators are required to certify on their manifests that they have a program in place to reduce the volume or quantity and toxicity of the materials they manage; and (2) hazardous waste treatment storage and disposal facilities are required to provide a similar certification. Such programs must exist if they are economically practical.

Clean Air Act (CAA)

There are five primary sections of the CAA that involve pollution prevention: air toxics, mobile sources, new source review, acid rain, and chloroflourocarbons. The CAA gives EPA the authority to require pollution prevention measures to control and limit air toxics. EPA has the power to require air pollution control equipment, substitution of materials, modifications to work procedures, and operator training and certification. For mobile sources, EPA requires an increasing percentage of alternatively fueled vehicles and requires the development of reformulated gasoline and oxygenated fuels to decrease air pollutants. New sources located in non-attainment areas must use stringent air pollution controls and provide offsets (emission reductions from some other source). To help prevent acid rain, the CAA imposes stringent sulfur dioxide emissions limits and creates a system of tradable emissions allowances. Finally, the CAA requires phase-out of the production and sale of chlorofluorocarbons (CFCs) and several other chemicals that have been shown to contribute to the destruction of the stratospheric ozone layer.

Clean Water Act (CWA)

Under the CWA, the EPA has the authority to develop technology-based, industry-specific national limits on the amounts of regulated pollutants a facility is allowed to discharge into the nation's waters. This program is implemented through the issuance of National Pollutant Discharge Elimination System (NPDES) permits and

includes discharges of contaminated storm water. Under the auspices of this Act, the EPA may recommend or mandate pollution controls.

Toxic Substances Control Act (TSCA)

This Act provides the EPA with the authority to issue an order prohibiting or limiting the manufacture, processing, distribution in commerce, use, or disposal, of a chemical substance. In addition, it provides the EPA with the authority to impose labeling, testing, reporting, and other requirements, when the manufacturing, processing, distribution, use, or disposal of an existing chemical or substance or mixture presents an unreasonable risk of injury to health or the environment.

Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

All pesticides that are distributed or sold must be registered with the EPA, unless they are subject to experimental use permits or an exemption. EPA may issue a notice of intent to cancel registration, change a pesticide's classification, or hold hearings on use of a pesticide, if the pesticide is not in compliance or causing unreasonable adverse effects. EPA has the authority to suspend use of a pesticide to prevent an imminent hazard. The administrator has the authority to seize pesticides, or to issue "stop sale, use, or removal" orders if the pesticide is in violation of any FIFRA provision, or if the registration has been canceled.

2.4 State Laws

The Federal Facilities Compliance Act (FFCA) of 1992 requires all Federal facilities to comply with all applicable hazardous waste laws and corresponding Federal, State, and local regulations. The Act makes Federal facilities fully responsible for complying with the Resource Conservation and Recovery Act and other Federal environmental laws. Waste generators can reduce the burden of these laws by implementing pollution prevention alternatives.

States have promoted pollution prevention as a means to improve environmental management since the early 1980s (EPA, 1993). In general, states maintain technical assistance functions that disseminate pollution prevention information to support industrial facilities in their efforts to minimize pollution. In addition, many states have

modified their regulatory programs, including permitting, compliance inspections, and enforcement actions, to incorporate and promote pollution prevention as a method to meet environmental quality goals. Several States have enacted legislation or regulations promoting or mandating pollution prevention facility planning. For these reasons, it is important that each federal facility meet not only the pollution prevention requirements of Executive Order 12856 but also the pollution prevention requirements of the State environmental program. In cases where the Federal and State requirements overlap, the facility should meet the more stringent of the two requirements. Since each State's pollution prevention program is continuing to be developed, it is critical that each Federal facility periodically check with their State Regulators on current pollution prevention requirements. A good summary of primary State pollution prevention requirements is contained in the EPA document, "Federal Facility Pollution Prevention."

EXECUTIVE ORDERS

2.5 Executive Order 12856 - Federal Compliance with the Right-to-Know Laws and Pollution Prevention Requirements (August 3, 1993)

Executive Order 12856 is a comprehensive executive order that sets out to ensure federal facilities meet or exceed the chemical reporting requirements of EPCRA of 1986 (42 U.S.C. §§11001-11050) and the pollution prevention requirements of the PPA of 1990 (42 U.S.C. §§13101-13109). As a result of EO 12856, federal agencies must place a high priority on funding to reduce pollution. In the case of DOD, this can be accomplished by such methods as, identifying and eliminating or reducing requirements for toxic chemicals in military specifications and by incorporating pollution prevention objectives into purchasing decisions. An additional impact of this Executive Order is that many Army, Navy (including Marine Corps), and Air Force installations were required to develop pollution prevention program plans by the end of 1995. The pollution prevention requirements of EO 12856 are the primary focus of this paper and will be discussed in more detail in the following paragraphs.

The overall objectives of EO 12856 are: (1) to ensure all federal facilities conduct their facility management and acquisition practices in such a manner as to reduce the amount of toxic chemicals entering any waste stream through source reduction and recycling activities; (2) to require federal agencies to report and make available to the public information on toxic chemicals entering any waste stream from their facility, and to improve local emergency planning, response, and accident notification; and (3) to encourage markets for clean technologies and safe alternatives to toxic chemicals and hazardous substances through revisions to standards and practices of the federal procurement process and the testing of innovative pollution prevention technologies at these facilities (Freeman, 1995). This order applies to all federal agencies that own or operate a "facility" (as defined in section 329(4) of EPCRA) but does not replace any other existing obligations to which these federal facilities are already subject under EPCRA and PPA provisions.

EO 12856 requires the head of each federal agency to develop a written pollution prevention strategy to achieve the three objectives. EO 12856 also directs each federal agency to establish voluntary goals to reduce the agency's total releases of toxic chemicals to the environment, and to reduce the off-site transfer of such toxic chemicals for treatment and/or disposal by 50 percent by December 31, 1999. Alternatively, the federal agency may choose to implement a plan that achieves a 50 percent reduction in toxic pollutants. Each federal agency must have developed a written pollution prevention plan by December 31, 1995, and must begin to conduct follow-up assessments as required to ensure the development of such plans and programs.

Each federal agency must establish a plan to eliminate or reduce the purchasing of products containing toxic or extremely hazardous substances. In addition, each agency must make efforts to reduce its use, manufacturing, or processing of extremely hazardous substances and toxic chemicals. Federal agencies are strongly encouraged to identify and use innovative pollution prevention technologies.

Federal agencies are directed to comply with provisions in Sections 301-313 of EPCRA (record keeping and reporting requirements), Section 6607 of PPA (source reduction and recycling data collection), and regulations and guidance issued by EPA. Each facility will comply with these provisions and each report will address all releases,

transfers, and wastes at the facility site. In the case of DOD, more stringent reporting requirements have been set than those required by law.

2.6 Executive Order 12843 - Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances (April 21, 1993)

This executive order recognizes the importance of addressing the current depletion of the ozone layer caused by the use of ozone depleting substances. Agencies are required to accomplish several important objectives. Agencies must maximize their use of alternatives to ozone depleting substances, evaluate current and future use of these substances, and identify opportunities for recycling. Procurement regulations and policies must be revised to conform with the requirements of Title VI of the Clean Air Act Amendments addressing stratospheric ozone protection. This entails modification of procurement specifications and procedures to substitute non-ozone-depleting substances for ozone-depleting substances whenever economically practicable. Reports summarizing efforts to implement EO 12843 were required to be submitted by federal agencies to the Office of Management and Budget by October 23, 1993.

2.7 Executive Order 12844 - Federal Use of Alternately Fueled Vehicles (April 21, 1993)

Under the authority of the Energy Policy Act of 1992 (PL 102-486), Energy Policy and Conservation Act (42 U.S.C. §6201 et seq.), and the Motor Vehicle and Cost Savings Act (15 U.S.C. §1301 et seq.), Executive Order 12844 mandates the use of alternately fueled vehicles by federal agencies. Each agency is required to purchase 50 percent more alternately fueled vehicles during the period of 1993 to 1995 than currently specified in the Energy Policy Act of 1992. The purpose of this initiative is to substantially reduce toxic and hazardous air pollutants and decrease pollution associated with energy development activities. The Fleet Conservation Task Force convened by the Secretary of Energy will oversee the federal fleet acquisition program.

2.8 Executive Order 12845 - Requiring Agencies to Purchase Energy-Efficient Computer Equipment (April 21, 1993)

So that the federal government sets an example in the energy efficient operation of its facilities and the procurement of pollution prevention technologies, agencies must procure energy efficient computer equipment. The United States Federal Government is the largest purchaser of computer equipment in the world and thereby has the capacity to greatly accelerate the movement toward energy efficient computer equipment. Executive Order 12845, under the authority of sec. 152 of the Energy Policy Act of 1992 (PL 102-486), the Energy Policy and Conservation Act (42 U.S.C. §6361), and sec. 205 of the Federal Property and Administrative Services Act (40 U.S.C. §486), mandates that federal agencies must ensure that all computer equipment purchased meets "EPA Energy Star" requirements. Agencies are directed to educate federal computer users concerning the economic and environmental benefits of use of energy efficient computers, including pollution prevention.

2.9 Executive Order 12873 - Federal Acquisition, Recycling, and Waste Prevention (October 20, 1993), as Amended by Executive Order 12995 (March 25, 1996)

The purpose of Executive Order 12873 (as amended by EO 12995) is to have the Federal Government make more efficient use of natural resources by maximizing recycling and preventing waste wherever possible. Through cost-effective waste prevention and recycling activities, the government is to work to conserve disposal capacity, and serve as a model in this regard for private and other public institutions. The use of recycled and environmentally preferable products and services by the Federal Government can spur private sector development of new technologies and the use of such products.

In the preamble for EO 12873, it states, "each Executive Agency shall incorporate waste prevention and recycling in the agency's daily operations and work to increase and expand markets for recovered materials through greater

Federal Government preference and demand for such products.” This order creates a Federal Environmental Executive and establishes high-level environmental executive positions within each agency to be responsible for expediting the implementation of the order. The Federal Environmental Executive, in consultation with the Agency Environmental Executives, is required to: (1) identify and recommend initiatives for government-wide implementation of the executive order including, development of a federal implementation plan and guidance for instituting economically efficient federal waste prevention, energy, and water efficiency, and recycling programs; (2) collect and disseminate information electronically concerning methods to reduce waste and recycle materials; (3) provide guidance and assistance to the agencies in setting up and reporting on agency programs and monitoring their effectiveness; and (4) coordinate appropriate government-wide education and training programs.

Acquisition planning must be performed and affirmative procurement programs must be implemented by each federal agency. Agencies must consider the following factors: elimination of virgin material requirements; use of recovered materials; reuse of product; life-cycle cost; recyclability; use of environmentally preferable products; waste prevention (including toxicity reduction or elimination); and ultimate disposal. Each agency was required to establish a goal for solid waste prevention and a goal for recycling that was to be met by 1995.

2.10 Executive Order 12902 - Energy Efficiency and Water Conservation at Federal Facilities (March 8, 1994)

Executive Order 12902 outlines several different energy conservation programs to be developed and implemented at most federal facilities. Through the Federal Energy Management Program, the Department of Energy is the lead agency for this effort. The major provisions of this order to be executed by federal agencies are as follows:

- Develop and implement programs to reduce energy consumption and increase energy efficiency at their facilities. This can be done by using prioritization studies, facility audits, and technologies for energy efficiency, water conservation, and renewable energy.
- Form programs to significantly increase the use of solar power and other renewable energy sources.
- Institute programs to use cleaner, less-polluting fuels and energy sources instead of petroleum based products, and reduce petroleum usage where such alternatives are not practical.

2.11 Executive Order 12969 - Federal Acquisition and Community Right-to-Know (August 8, 1995)

Under the authority of the Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 (42 U.S.C. §11001-11050) and the Pollution Prevention Act (PPA) of 1990 (42 U.S.C. 13101-13109), programs were established to protect public health and the environment by providing the public with important information on the toxic chemicals being released into the air, water, and land by manufacturing facilities. Sharing Toxic Release Inventory (TRI) information with the public has provided a strong incentive for reduction in the generation, and ultimately, release of toxic chemicals into the environment. Since the inception of the TRI program, reported releases to the environment have decreased significantly.

Executive Order 12969 sets the policy for procurement by the government for supplies and services and states that, "federal agencies, to the maximum practical extent, shall contract with companies that report in a public manner on toxic chemicals released to the environment." Where practical, each federal agency should include in contract solicitations expected to exceed \$100,000, the requirement that contractors file (and continue to file for the life of the contract) a Toxic Chemical Release Form ("Form R") for each chemical manufactured, processed, or otherwise used by the federal contractor at a facility, as described in section 313 of EPCRA and section 6607 of PPA. If a federal contractor fails to file the necessary forms or complete them properly, the government may choose to terminate the contract for convenience.

2.12 Conclusion

This chapter attempted to provide a broad overview of the laws and executive orders that affect how the Department of Defense executes its Pollution Prevention Program. These laws and executive orders provide the

framework through which DOD has structured its comprehensive program. The aim of the DOD is to have a visible, pro-active, and well managed pollution prevention program that is a model for other government agencies and industry to follow.

CHAPTER 3: Department of Defense P2 Program

The Department of Defense vision is to effectively promote the national policy of pollution prevention through education, training, awareness, acquisition practices, facilities management, energy conservation, and the use of innovative pollution prevention technologies. Pollution prevention has been an integral, proactive, expanding, and comprehensive component of the Department of Defense environmental program. Pollution prevention planning, programs, training and activities within the Department of Defense are ongoing at the Department level and within the military Departments in a wide range of subordinate commands, laboratories, agencies, and installations. Military Department pollution prevention programs are extensive, focused on a variety of objectives, and operate on broad programmatic guidance from DOD. DOD pollution prevention programs are typically integrated with technology transfer and material development programs; often, information about pollution prevention can be accessed through defense systems acquisition or technology transfer programs (Enviro\$en\$e 1996).

3.1 Department of Defense (DOD) Pollution Prevention Program

DOD policy demonstrates the Department's commitment to making pollution prevention part of the decision making process in installation management, acquisition practices, and technology development. Concerted efforts by installation commanders and weapon system program managers to consider future environmental impacts have created numerous success stories. The goal of the DOD pollution prevention program is to replicate these successes by directing that all management decisions incorporate efforts to limit or eliminate future environmental problems.

Department of Defense References:

- DOD Directive 4210.15, Hazardous Material Pollution Prevention
- DOD Directive 5030.41, Oil and Hazardous Substance Pollution Prevention and Contingency Planning
- DOD Directive 6050.9, U.S. Secretary of Defense for Acquisition, Chlorofluorocarbons (CFCs) and Halons
- DOD Instruction 5000.2, Defense Acquisition Program Procedures
- DOD Instruction 6050.5, DOD Hazardous Communication Program

Department of Defense Pollution Prevention Strategy

On August 11, 1994, Secretary of Defense William Perry issued a Memorandum which contained a long-term, Department wide strategy for pollution prevention. This strategy incorporates the requirements of Executive Orders 12856, 12873 "Federal Acquisition, Recycling and Waste Prevention" and 12902 "Energy Efficiency and Water Conservation at Federal Facilities" as well as recommendations from the Deputy Under Secretary of Defense (Acquisition Reform) Process Action Team report "Blue Print for Change." The strategy is provided below in its original format.

Vision Statement:

Effectively promote the national policy of pollution prevention through education, training and awareness, acquisition practices, facilities management, energy conservation, and the use of innovative pollution prevention technologies.

Objective 1:

Effectively promote and instill the pollution prevention ethic through comprehensive education, training and awareness in all mission areas.

Sub-objective 1:

- Develop an environmentally aware and knowledgeable DOD community (including military and civilian personnel) through integrated education and training in pollution prevention.
- Equip our work force with the skills and knowledge to accomplish the mission while minimizing the production and introduction of pollutants into the environment.
- Institutionalize and continually improve pollution prevention training for our personnel at all grades and organizational levels.

Sub-objective 2:

- Promote pollution prevention awareness through multimedia outreach/awareness programs and partnerships.
- Strengthen working relationships with environmental regulators at all levels.
- Foster partnerships with local communities and industry by: public participating in comprehensive community planning and public affairs; enhancing the coordination and effectiveness of emergency planning and response capabilities; promoting the elimination of hazardous substances and the reduction of the generation of waste; encouraging affirmative procurement, reuse, and recycling.

Sub-objective 3:

- Encourage and recognize outstanding individual, team and installation pollution prevention contributions through both existing and new awards/incentive programs.

Office of the Secretary of Defense (OSD) Offices of Primary Responsibility: Under Secretary of Defense (Personnel and Readiness) for training policy, Deputy Under Secretary of Defense (Environmental Security), and Director, Acquisition Education and Training for implementation and Oversight.

Objective 2:

Incorporate pollution prevention into all phases of the acquisition/procurement process.

Sub-objective 1:

- Integrate pollution prevention and other environmental concerns into the entire life-cycle of acquisition programs from concept development to final disposal.

GOAL: Identify and/or develop environmental life-cycle cost estimating tools.

GOAL: By January 1995, put into effect revised Military Standard 499B, Systems Engineering, which mandates that environmental effects receive equal treatment with other system requirements of acquisition programs.

Sub-objective 2:

- Establish and execute an aggressive program to identify and reduce or eliminate toxic chemicals and extremely hazardous substances procurement generated through the use of specifications and standards.

GOAL: By 3 August 1995, review standardization documents (as defined by the Department of Defense Index of Specifications and Standards (DODISS)) identifying opportunities to eliminate and reduce the use of toxic chemicals and extremely hazardous substances; and complete all revisions by 1999.

Sub-objective 3:

- Integrate environmental considerations into acquisition documentation, strategies, plans, and in the planning and awarding of contracts.

GOAL: Establish a plan and goals for eliminating or reducing the acquisition of products containing extremely hazardous substances and toxic chemicals.

GOAL: Establish a plan and goals for reducing the manufacture of extremely hazardous substances and toxic chemicals.

GOAL: By August 3, 1995, submit any Federal Acquisition Regulation (FAR) revisions necessary to implement this strategy to the Civilian Agency Acquisition Council.

GOAL: Issue clarifying guidance for content and documentation of the Programmatic Environmental Analysis described in DOD 5002.M, Part 4, Section F.

GOAL: Assure that significant environmental costs are included in the life-cycle cost estimates of major defense acquisition programs.

Sub-objective 4:

- Provide contracting incentives to stimulate markets for environmentally preferable products and services.

Sub-objective 5:

- Specify requirements for the purchase of environmentally preferable products and services.

GOAL: Meet or exceed the following minimum materials content standards when purchasing or causing the purchase of printing and writing paper:

For high speed copier paper, offset paper, forms bond, computer printout paper, carbonless paper, file folders, and white woven envelopes, the minimum content standard shall be no less than 20 percent post-consumer materials beginning December 31, 1994. This minimum content standard shall be increased to 30 percent beginning on December 31, 1998.

For other uncoated printing and writing paper, such as writing and office paper, book paper, cotton fiber paper, and cover stock, the minimum content standard shall be 50 percent recovered materials, including 20 percent post-consumer materials beginning on December 31, 1994. This standard shall be increased to 30 percent beginning on December 31, 1998.

As an alternative to meeting the standards in goal (a) and (b), for all printing and writing papers, the minimum content standard shall be no less than 50 percent recovered materials that are a waste material by-product of a finished product other than a paper or textile product which would otherwise be disposed of in a landfill, as determined by the State in which the facility is located.

Sub-objective 6:

- Develop and implement affirmative procurement programs in accordance with the Resource Conservation and Recovery Act and Executive Order 12783.

OSD Offices of Primary Responsibility: Director, Acquisition Program Integration; Director, Defense Procurement; Assistant Secretary of Defense (Economic Security); Deputy Under Secretary of Defense (Acquisition Reform); Deputy Under Secretary of Defense (Environmental Security); and Director, Program Analysis & Evaluation.

Objective 3:

Achieve and preserve environmental quality for all activities, operations, and installations through pollution prevention.

Sub-objective 1:

- Develop, maintain, and implement pollution prevention plans at each installation and facility. These plans should include baselines, pollution prevention assessments and investment strategies.
- Develop and implement methods to identify and quantify releases and off-site transfers of toxic chemicals to all media (i.e., air, water, soil, surface and ground water).

Sub-objective 2:

- Minimize the use of hazardous materials in all activities.

Sub-objective 3:

- Implement cost-effective waste reduction at all installations and facilities to include government owned-contractor operated (GOCO) or leased facilities.

Sub-objective 4:

- Minimize releases and off-site transfer of toxic chemicals through the use of pollution prevention practices.

GOAL: By 1999, achieve a 50% reduction of total releases and off-site transfers of toxic chemicals from the 1994 Toxics Release Inventory baseline.

Sub-objective 5:

- Ensure that installations comply with the Emergency Planning and Community Right-To-Know Act of 1986 to the maximum extent possible.
- Develop and maintain a comprehensive inventory of toxic chemicals, extremely hazardous substances and hazardous chemicals, and the processes, systems, and management practices that use these chemicals.
- Operate, maintain and upgrade existing facilities to conserve water and energy when cost-effective to do so. Incorporate renewable energy technologies into existing facilities when cost-effective.

Sub-objective 6:

- Support the Department's energy resource management programs to assure all Defense Components comply with the Energy Policy Act of 1992 and Executive Order 12902 to achieve energy and water conservation and increased use of renewable energy sources.
- Implement a comprehensive program to accomplish cost effective conservation in all existing installations and energy systems.
- Develop and apply incentive programs such as gain sharing, shared energy performance contracting and utility demand side management programs.

- Design and construct new facilities to minimize the life-cycle cost of the facility by utilizing energy and efficiency techniques and renewable energy technologies.

GOAL: By 2005, identify and accomplish all energy and water conservation actions which pay back in ten years or less.

GOAL: By 2000, achieve a reduction in facilities energy consumption, as measured in MTBUs/1000 SF, by 20% from the 1985 baseline.

GOAL: By 2005, achieve a reduction in facilities energy consumption, as measured in MTBUs/1000 SF, by 30% from the 1985 baseline.

GOAL: By 2005, achieve an increase in industrial facilities energy use efficiency by 20% from the 1990 baseline.

Sub-objective 7:

- Maximize the use of environmentally friendly materials in the planning, programming, construction and maintenance of facilities and installations.

Sub-objective 8:

- Establish and promote efficient material/energy use practices through conservation, re-utilization, materials substitution, recycling, affirmative procurement and the creation of markets for recycled materials.

Sub-objective 9:

- As appropriate, installation pollution prevention planning and investment strategies must consider environmental justice concerns in accordance with Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

Sub-objective 10:

- Fully implement integrated pest management throughout DOD to reduce pesticide risk.

GOAL: By 30 September 2000, reduce the amount of pesticide applied annually, as measured in pounds of active ingredient, by 50% from the FY 1993 baseline.

OSD Offices of Responsibility: Deputy Under Secretary of Defense (Environmental Security) and Deputy Under Secretary of Defense (Logistics).

Objective 4:

Develop, demonstrate and implement innovative pollution prevention technologies.

Sub-objective 1:

- Identify, quantify, integrate and prioritize DOD Component environmental security technology user requirements.
- Focus pollution prevention Research, Development, Test, and Evaluation (RDT&E) on developing and validating critical technologies needed for material and process modification.

Sub-objective 2:

- Based on the annual "DOD-Wide Environmental Technology Requirements Strategy," develop and support a "DOD-Wide Environmental Quality Research, Development, Test and Evaluation Strategic Plan" which will include sections on identifying, prioritizing, planning, programming and budgeting for pollution prevention RDT&E of materials and process modifications that emphasize source reduction and cost avoidance.

Sub-objective 3:

- Leverage and integrate DOD's pollution prevention RDT&E programs with those of other government agencies, academia, and private industry.
- Identify material and process substitutes in Defense technologies that have Government-wide and commercial application for expedited implementation.
- Foster cooperative government-industry partnerships/alliances to solve issues of environmental significance.
- Actively demonstrate and implement off-the-shelf technologies.

OSD Offices of Primary Responsibility: Director, Defense Research & Engineering; Assistant Secretary of Defense (Advanced Technology), and Deputy Under Secretary of Defense (Environmental Security).

The comprehensive DOD Strategy just described, which includes four primary objectives and twenty-two sub-objectives, provides the structure and specific goals through which the Military Departments must build their pollution prevention programs.

3.2 The Current Status of the DOD P2 Program

As stated in a February 1995 report from DOD to the President and Congress, DOD is building a foundation of cooperation and, most importantly, trust with the public and environmental regulators. The major elements of environmental security are: pollution prevention, technology, safety and occupational health, conservation, compliance, cleanup, explosive safety, and pest management. Pollution prevention is discussed below.

The Department of Defense is strongly committed to a pollution prevention program that affects every aspect of its activities. Through this program, liabilities for future cleanup and additional expenses for complying with environmental, safety, and health laws can be dramatically reduced. Further, many of the pollution prevention projects yield a better product in a more efficient manner. In short, the pollution prevention program reduces costs, improves readiness, and protects the environment.

DOD is committed to becoming a leader in pollution prevention. These efforts require changing current acquisition practices, reviewing procedures and materials used in the maintenance and operation of existing weapon systems, supporting vigorous research and development programs to develop environmentally benign alternatives, and carefully managing hazardous materials and resulting emissions.

The Defense Department made significant progress during fiscal year (FY) 1994 by:

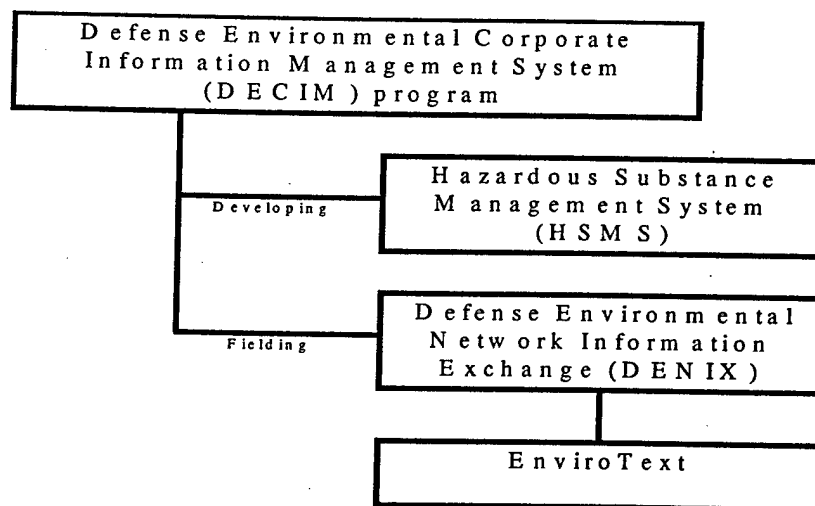
- Working closely with the private sector to adopt National Aerospace Standard 411, Hazardous Materials Management Program. This standard will help reduce hazardous material usage and generation of pollutants during manufacture, operation, and maintenance of major weapon systems.
- Establishing an industrial-scale demonstration factory at the National Defense Center for Environmental Excellence (NDCEE) in Johnstown, PA where clean technologies can be tested under realistic conditions.
- Developing a Hazardous Substance Management System, a defense-wide automated network to enable installations to track toxic materials from cradle to grave. This will ensure these materials are used, controlled, and disposed of properly.
- Encouraging the procurement of products with recycled -- or recyclable -- components. This will help institutionalize the recycling ethic as both recyclers and manufacturers realize that a large and active customer is interested in obtaining products made with recyclable content.

DOD plans to continue to incorporate environmental security considerations into all aspects of weapon system acquisition, maintenance, and operations. Life-cycle costs are to be considered during major milestone reviews for new weapon systems. This effort will ensure that full environmental security costs associated with maintaining and disposing of systems are considered in addition to initial purchase price. In addition, maintenance and operational practices must be reviewed for existing weapon systems and more environmentally benign approaches should be identified where possible. The Department's goal is to curb its use of hazardous materials and its releases of pollutants as near to zero as feasible.

3.3 Hazardous Substance Management System (HSMS) and DENIX

An important DOD initiative is the development of the Hazardous Substance Management System (HSMS) by the Defense Environmental Corporate Information Management System (DECIM) program. The HSMS will be a Defense-wide standard system that will enable installations to track hazardous materials cradle to grave by chemical constituent. Together with management initiatives, HSMS will make it easier for DOD installations to comply with the Toxic Release Inventory reporting requirements of Executive Order 12856 and reduce hazardous materials disposal cost.

DECIM is also responsible for the development and fielding of the Defense Environmental Network Information Exchange (DENIX). DENIX is a Defense-wide environmental bulletin board that enables DOD personnel to exchange information easily. DENIX also gives access to EnviroText which contains full texts of Federal and State environmental laws, Federal and State occupational, safety, and health regulations, Native American Treaties, Proclamations, and tribal environmental regulations as well as a wealth of other data. The National Performance Review recognized EnviroText as being an important part of the Vice President's efforts to reinvent government.



Currently the following eight databases are available on DENIX (DENIX 1996):

- Ozone depleting substances (ODS)
- Solvent substitution
- Painting and depainting technologies
- Electroplating and bath life extension
- Wastewater management and reuse
- Petroleum, Oil, and Lubricants (POL) recycling and reuse

- Solid waste management
- Hazardous material (HM) and Hazardous waste (HW) management

Future databases will include:

- Air issues
- VOC reductions
- Reducing stack emissions
- Indoor air quality issues
- Pre-production equipment (this database will cover new technologies being tested in the field)
- Materials re-utilization

Each database uses the following format:

- "Technology Sheet Title"
- Process or Product
- Process Code
- Substitute for
- Waste Stream
- Applicable EPA Hazardous Waste Code(s)
- Applicable EPCRA Targeted Constituent
- Introduction
- Description
- Material Compatibility
- Benefit
- Economic Analysis
- Major Assumptions
- Points of Contact
- Vendors
- Approving Authority

At the present time, only DOD personnel and contractors can access the DENIX system.

3.4 National Defense Center for Environmental Excellence (NDCEE):

A DOD initiative, NDCEE's initial goal is to lead and support the military and commercial industrial base in its transition to environmentally acceptable manufacturing technologies. The Center, located in Johnstown, PA, provides means of testing, evaluating and applying new environmentally-acceptable manufacturing technologies (Enviro\$en\$e 1996).

Its mission is to systematically address industrial base problems and to identify and implement environmentally acceptable solutions for the following areas: pollution prevention; manufacturing waste minimization;

demilitarization; hazardous waste site remediation; RCRA waste management; air pollution management; medical waste management; and water pollution management.

NDCEE technical objectives include: leading the conversion to environmentally acceptable manufacturing technologies in DOD and industry; providing a unique capability for full scale process testing to minimize manufacturer risk during conversion; developing effective controls to increase process reliability; and serving as a national resource for environmental technological information.

NDCEE technical products and services include: environmental health and safety audits, waste minimization and pollution prevention planning, demonstration and validation support, risk analysis and process modeling, analytical studies, custom designed drawing, shop floor start up assistance, hands-on operator training, integrated logistics support, process control design, intellectual property protection, regulatory analysis assistance, and life-cycle analysis.

To carry out its mission, NDCEE established an industrial-scale manufacturing demonstration factory at its headquarters in Johnstown, PA. The facility enables NDCEE to test 27 clean technologies in organic finishing, advanced part cleaning, coatings removal, inorganic finishing, and process solution and rinse water regeneration.

In April 1994, NDCEE officially unveiled the first of these technology capabilities, the industrial-scale Organic Coating Demonstration Line. The line includes a loading station, nine-stage pretreatment area, dry-off oven, liquid paint and powder spray booths, separate liquid and powder paint baking ovens, and unloading station.

To assist small business and military installations in transitioning to advanced, environmentally acceptable technologies, NDCEE uses a three step process which includes: Baseline Surveys, Interim Adjustments, and Facility Modernization.

In the Baseline Survey, NDCEE determines a company or military installation's environmental health and safety, compliance and cost status. The purpose of the survey is to evaluate the technical and economic justifications for the change.

Step two, Interim Adjustments, involve a technical investment analysis which yields a set of alternatives that would improve the customer's performance and environmental compliance. Data from the Baseline Survey help define how the customer's processes might be improved in the short term by employing low cost remedies such as

materials management, equipment operator adjustments, or process control adjustments. This interim step helps the customer to do what it does better, but without a large capital expenditure.

Finally, step three, Facility Modernization, assesses long-term equipment and materials replacement strategies. NDCEE and the customer develop guidelines for testing and design processes to be prototyped. NDCEE and the customer also evaluate alternatives to determine projected performance and cost factors including equipment costs, start-up costs, operating costs, and product quality. NDCEE then verifies that proposed process changes would be beneficial through full scale verification under realistic operating conditions at the NDCEE Demonstration Factory. The NDCEE is operated by Concurrent Technologies Corporation, an independent non-profit institution under contract with DOD.

CHAPTER 4: Organizational Structure

Now that the basic concepts of pollution prevention were presented, the authority DOD has been granted for implementing a program has been discussed, and the DOD P2 Program Strategy has been outlined, it is time to move to the main purpose of this paper which is an evaluation of how the Army, Navy, and Air Force execute their Pollution Prevention Programs. Before delving into issues such as policies and procedures for program execution, it will be beneficial to review the organizational structure through which each service manages their program. This organization, often termed the "chain of command," establishes the framework through which decisions are to be made and carried out, funds are to be channeled, and reports are to be generated.

4.1 A Basic Overview of the DOD Organizational Structure

The Department of Defense (DOD) (DOD Directive 5100.1) is responsible for providing the military forces needed to deter war and protect the security of the United States. The major elements of these forces are the Army, Navy, Air Force, and Marine Corps. Under the President, who is also Commander-in Chief, the Secretary of Defense exercises authority, direction, and control over the Department which includes the Office of the Secretary of Defense, the Chairman of the Joint Chiefs of Staff and the Joint Staff, three Military Departments, nine Unified Combatant Commands, the DOD Inspector General, sixteen Defense Agencies, and nine DOD Field Activities.

Department of Defense (DOD) Agencies

The Defense Agencies are organizations separate from the military Departments, and reporting directly to the Secretary of Defense. The Defense Agencies (a list of these agencies follows) provide support or services to all the Military Departments, or provide highly specialized support to the Department of Defense staff. Most of the Defense Agencies' facilities and organizations are located on installations belonging to one of the Military Departments, although some Defense Agencies operate their own installations. Defense Agency tenants on host

installations typically participate in the installation pollution prevention program; some Defense Agencies have established their own pollution prevention programs.

DEFENSE AGENCIES

Advanced Research Projects Agency
Ballistic Missile Defense Organization
Central Imagery Office
Defense Commissary Agency
Defense Contract Audit Agency
Defense Finance and Accounting Service
Defense Information Systems Agency
Defense Intelligence Agency
Defense Investigative Service
Defense Legal Services Agency
Defense Logistics Agency
Defense Mapping Agency
Defense Nuclear Agency
Defense Security Assistance Agency
National Security Agency/Central Security Service
On-Site Inspection Agency

Department of Defense (DOD) Field Activities

The DOD Field Activities (a list of these activities is shown below) are established by the Secretary of Defense, under the provisions of Title 10, United States Code, to perform selected support and service functions of a more limited scope than Defense Agencies.

DOD FIELD ACTIVITIES

American Forces Information Service
Defense Medical Programs Activity
Defense Prisoner of War/Missing In Action Office
Defense Technology Security Administration
Department of Defense Civilian Personnel Management Service
Department of Defense Education Activity
Office of Civilian Health and Medical Program of the Uniformed Services
Office of Economic Adjustment
Washington Headquarters Services

The Military Departments (DOD Directive 5100.1) are the Departments of the Army, Navy, and Air Force (the Marine Corps is a part of the Department of the Navy). Each Military Department is separately organized under its own Secretary and functions under the authority, direction, and control of the Secretary of Defense. The Military

Departments are responsible for organizing, training, supplying, and equipping forces for assignment to Unified Combatant Commands. A discussion of the pollution prevention organizations of the three Military Departments follows.

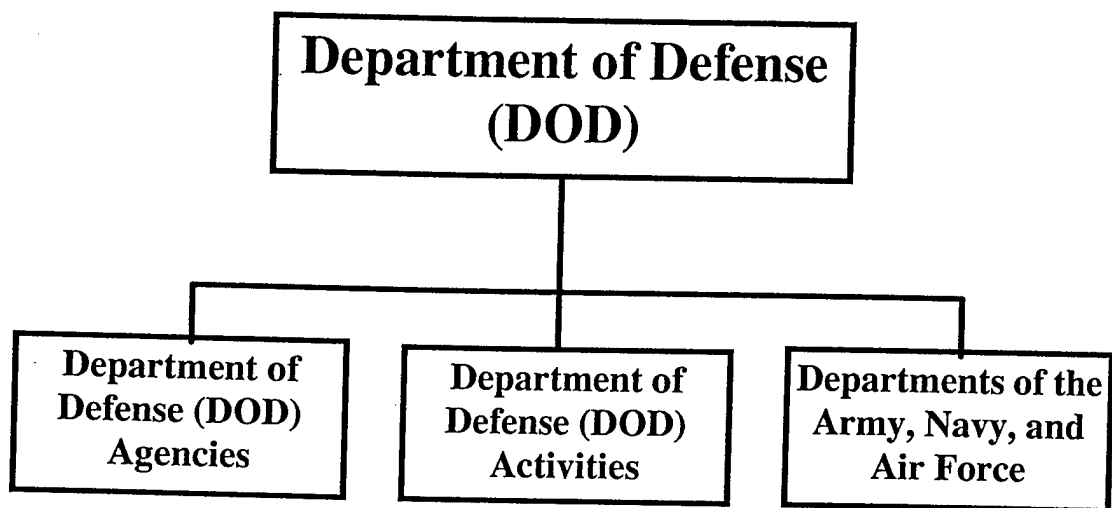
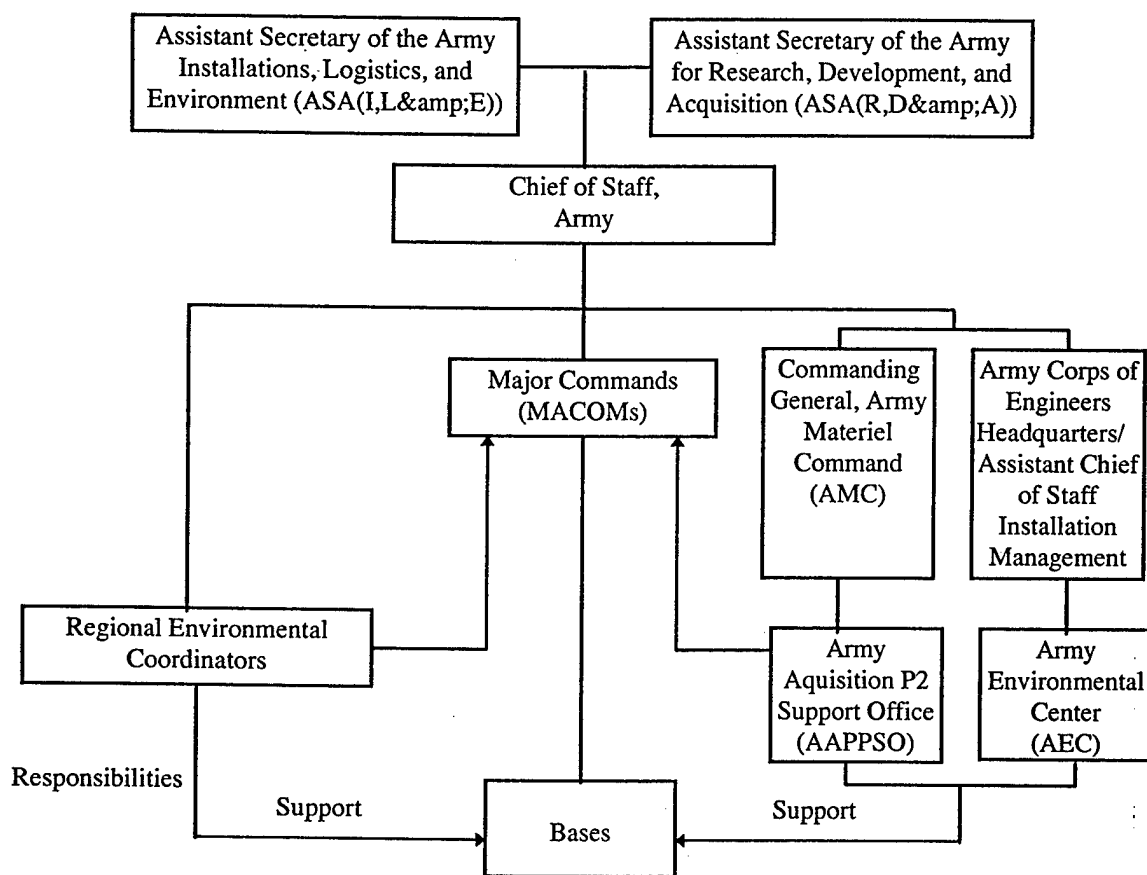


Figure 4.1: Organization of the Department of Defense

4.2 The Organizational Structure of the Army P2 Program

The Army's primary environmental organization (AR 200-1) can be broken down as depicted in the organization chart provided below. Specific pollution prevention responsibilities for these positions/organizations are detailed in the paragraphs that follow. Additional positions/organizations not shown on this organizational chart are discussed as well.



Assistant Secretary of the Army for Installations, Logistics, and Environment (ASA(I,L&E)):

Exercises oversight and approval over aspects of the Pollution Prevention Program including policy development. This ensures consistency with total environmental program goals.

Serves as the Army representative to the United Nations Environmental Program and acts as the primary Army pollution prevention focal point with the Office of the Secretary of Defense.

Assistant Secretary of the Army for Research, Development, and Acquisition (ASA(R,D&A)):

In coordination with ASA(I,L&E), exercises oversight and approval authority over all environmental and pollution prevention actions related to system acquisition, research and development, procurement, and contracting.

Develops and maintains environmentally related system acquisition policy consistent with laws, regulations, executive orders and DOD guidance.

Develops standard procedures to ensure that all environmental factors, especially pollution prevention and waste minimization, are fully considered as an integral part of the Milestone Decision Review process.

The Army Acquisition Executive ensures that materiel developers give specific consideration in program acquisition strategies, master plans, source selection criteria, and procedures to actively seek opportunities to eliminate or reduce the use of materials and processes that generate all forms of waste or pollution in system manufacturing or maintenance.

Assistant Secretary of the Army for Financial Management ASA(FM):

Coordinates with Defense Finance and Accounting System (DFAS) to ensure that Army accounting systems track pollution prevention expenditures in the program, budget, and execution years across all appropriations and commands wherever practical.

Maintains a program and budget data base that reflects funding for, and improves visibility of, pollution prevention requirements.

Chief of Staff, Army (CSA):

Implements Army pollution prevention policy and applicable EO 12856 requirements and/or delegates certain authority to Assistant Chief of Staff for Installation Management (ACSIM), Commanding General, Army Materiel Command (AMC), major commands, or others.

Regional Environmental Coordinators:

The regional environmental coordinators (RECs) help coordinate environmental issues on a geographic basis. They work closely with the Environmental Protection Agency and local regulatory agencies to ensure each Army installation meets or exceeds regulatory requirements. The Army serves as the DOD Regional Executive Agent in EPA Regions IV, V, VII, and VIII (see Appendix 'E' for a listing of the States contained within each region).

Assistant Chief of Staff for Installation Management (ACSIM):

Provides Army Staff supervision and Army-wide technical direction for pollution prevention aspects of facilities engineering, housing, and energy and within Community and Family Support Activities. In these areas, the ACSIM will formulate pollution prevention aspects of policy, objectives, criteria, and standards for the design, construction, and operation of facilities and provide related input to the Army Environmental Strategy Action Plan - Pollution Prevention (ASAP-PP).

The Army Public Works Center provides facility engineering policy and technical guidance for planning and implementing these aspects of the Army Pollution Prevention Program.

The Director, Environmental Programs, has primary Army Staff responsibility for integrating pollution prevention into the Army Environmental Management Program and as such provides overall direction to the program. The

Director, Environmental Programs:

- Develops or participates in the development of all Army pollution prevention policy.
- Establishes program priorities and coordinates an investment strategy to ensure adequate funding.
- Assembles and maintains the total Army Environmental Strategy Action Plan - Pollution Prevention (ASAP-PP) and approves major Army command (MACOM) pollution prevention plans.
- Establishes and manages the Army-wide Pollution Prevention Opportunity Assessment (PPOA) and program planning initiatives.
- Establishes user requirements and provides inputs to the Environmental Quality R&D Program.
- In coordination with the Office of the ASA(I,L&E), ASA(R,D&A), and the Chief of Engineers (COE), the Director, Environmental Programs, provides oversight of and establishes priorities for the Environmental Quality R&D Program.
- In coordination with ASA(R,D&A), establishes a single point of contact to determine accuracy and adequacy of pollution prevention and programmatic environmental analyses or documentation from materiel developers.
- In coordination with ASA(R,D&A) and the COE, proposes pollution prevention initiatives for the Army Acquisition Pollution Prevention Action Plan based on the impact of toxic/hazardous emissions/releases from Army installations and facilities.
- Provides technical support and program execution assistance through the Army Environmental Center. As necessary, the Director, Environmental Programs, coordinates technical support and management assistance provided by other activities (e.g., Army Environmental Hygiene Agency, Corps of Engineers

Construction Engineering Research Laboratory, Army Safety Center, Army Public Works Center, and the Army Acquisition Pollution Prevention Support Office).

Army Environmental Center (AEC):

Provides worldwide support to the Army and DOD on specialized pollution prevention and environmental compliance issues. The products and services of the pollution prevention compliance division will be discussed in more detail in Chapter Six.

Deputy Chief of Staff for Logistics (DCSLOG):

Exercises oversight and approval authority for all logistics-related pollution prevention and waste minimization activities. This includes planning, programming, and budget.

Deputy Chief of Staff for Operations (DCSOPS):

Considers pollution prevention (including hazardous material/waste battlefield cleanup and retrograde) in all mobilization, deployment, combat operations, re-deployment, demobilization, and contingency plans.

Office of the Inspector General (OIG):

Identifies both systemic and emerging pollution prevention problems. Audits and inspects existing pollution prevention programs and tracks Inspector General Action Requests to identify problems or determine trends regarding pollution prevention.

Surgeon General:

Is the proponent for environmental health and occupational health aspects of the Army Pollution Prevention Program. These responsibilities are carried out through the Health Services Command, Army Medical Department Center and School, Army Environmental Hygiene Agency, and Medical Research and Development Command as applicable. The Surgeon General provides overall direction for Army Medical Department (AMEDD) supporting elements.

Director of Army Safety (DASAF):

Develops policy for safety aspects of the program and monitors public and environmental safety aspects of the program. The DASAF oversees and/or conducts technical safety reviews and field investigations concerning the nature and extent of potential safety and occupational health effects of pollution resulting from Army activities.

Army Chief/Corps of Engineers (COE) Research and Development Directorate:

Integrates pollution prevention within the Army's overall environmental quality R&D plan and accomplishes planning, programming, integration, and execution of the non-industrial oriented element of the Pollution Prevention R&D Program.

Commanding General, Army Materiel Command (AMC):

Provides general assistance to the materiel developer community and serves as Army Program Manager for the National Defense Center for Environmental Excellence (NDCEE).

Supports pollution prevention planning and integration as necessary across Program Executive Officer (PEO) and major subordinate command organizational lines.

Army Acquisition Pollution Prevention Support Office (AAPPSO):

The AAPPSO is the preeminent acquisition pollution prevention support activity in the United States Army. The AAPPSO maintains an engineering support staff, including contractors. The AAPPSO staff manage a technical development program designed to identify state-of-the-art pollution prevention technologies. AAPPSO performs the following services:

- Manages two major programs for the Army. The first is the Ozone-Depleting Chemical (ODC) Elimination program which focuses on finding alternative chemicals for halons and chlorofluorocarbons, which are no longer being produced. The second is the Executive Order 12856 program which involves a broad range of activities aimed at reducing the procurement and use of hazardous materials.
- Assesses the progress and conducts comprehensive reviews of an activity's Acquisition Pollution Prevention Program.
- Elicits input from many Army and non-Army groups concerning execution of an acquisition pollution prevention program.

- Publishes a "Materiel (note: this spelling, "Materiel," is used by the military when discussing weapons and equipment) Developer's Guide For Pollution Prevention." This guide is intended to raise awareness within the United States Army's Acquisition community in the area of pollution prevention and help ensure compliance with Federal, State, and local environmental regulations.
- Develops software specifically for aiding a Program Manager in inputting, identifying, and tracking materials and products used throughout all phases of a systems life-cycle.

Director, Army Environmental Policy Institute:

Identifies long-term technological, social, political, and legislative trends with respect to environmental problems.

Identifies and develops alternative policies and strategies, where appropriate, as needed to resolve these environmental problems and related legislative trends.

Commanding General, Training and Doctrine Command (TRADOC):

Oversees the design, development, and implementation of pollution prevention training programs through the TRADOC schools to ensure all Army personnel receive appropriate technical or general training. TRADOC systematically incorporates pollution prevention into all training and doctrine as manuals and programs of instruction are updated.

Commanding General, Military Traffic Management Command (MTMC):

Implements a pollution prevention program for transportation-specific wastes and transportation facilities and reviews MTMC policies and procedures for pollution prevention potential.

Commanding General, Space and Strategic Defense Command:

Coordinates and provides pollution prevention technical support for space and strategic defense material and provides functional support to strategic materiel developers.

As owner/operator of facilities:

- Implements a Pollution Prevention Program.
- Identifies ways to reduce pollution through pollution prevention opportunity assessments.
- Ensures/conducts pollution prevention training of personnel.

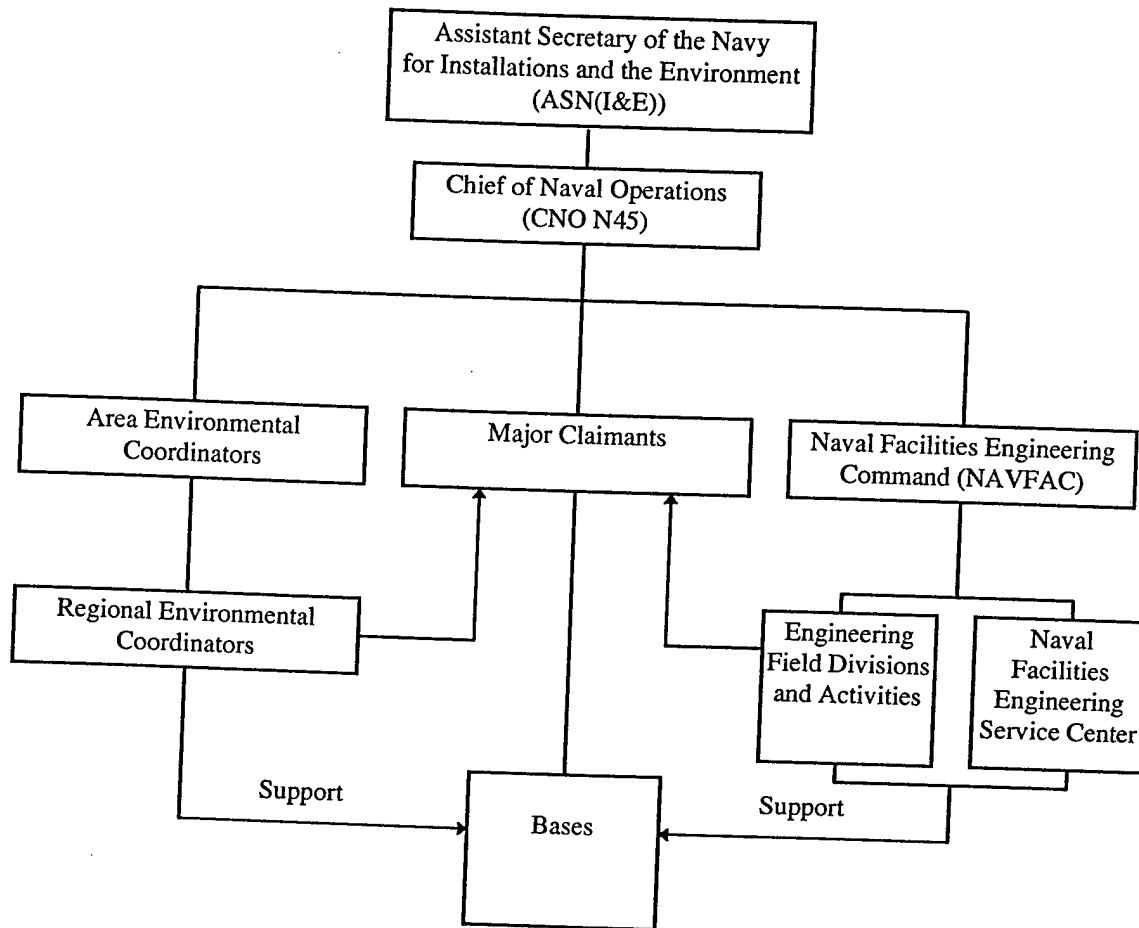
Commanders of MACOMs, installations, Army Reserve Components, and tenant activities:

In addition to specific responsibilities identified above, accomplish the following:

- Establish baseline for total toxic releases so that the baseline year for future reductions is no later than Calendar Year 1994. Commanders of MACOMs, installations, Army Reserve Components, and tenant activities comply with Emergency Planning and Community Right-to-Know Act and Pollution Prevention Act reporting requirements as well as all applicable provisions of Executive Order No. 12856.
- Establish or modify management infrastructure to ensure adequate focus of management and budget is applied and Army pollution prevention goals and objectives are achieved.
- Prepare a pollution prevention plan for the installation and MACOM level for review and approval by the Office of the Director, Environmental Programs.
- Assist in the conduct of comprehensive, multimedia pollution prevention planning efforts for all installations within a command.
- Develop MACOM-wide pollution prevention plans that: identify reduction goals, research and development requirements, process-specific pollution prevention opportunity assessment requirements, and an approaches for technical information transfer among installations under the MACOM.
- Implement MACOM-wide pollution prevention plans by supporting their installations in developing their pollution prevention plans and the development/implementation of specific projects.
- Program for, and subsequently implement, pollution prevention technology developed through the RDT&E Program.
- Report annually to the next higher headquarters on the status of pollution prevention programs, including new programs implemented and new technologies introduced.
- Budget and execute a pollution prevention program. Include tenant activity requirements.
- Ensure that pollution prevention is added to unit, installation, and MACOM Mission Essential Task Lists (METLs).
- Ensure/conduct pollution prevention training of personnel.

4.2 The Organizational Structure of the Navy P2 Program

The Navy's primary environmental organization (OPNAVINST 5090.1B) can be broken down as depicted in the organization chart provided below. Specific pollution prevention responsibilities for these positions/organizations are detailed in the paragraphs that follow. Additional positions/organizations not shown on this organizational chart are discussed as well.



Assistant Secretary of the Navy for Installations and Environment (ASN(I&E)):

Exercises oversight and approval over aspects of the Pollution Prevention Program including policy development. This ensures consistency with total environmental program goals.

Serves as the Navy representative to the United Nations Environmental Program and acts as the primary Navy pollution prevention focal point with the Office of the Secretary of Defense.

Chief of Naval Operations (CNO (N45)):

Implements Navy pollution prevention policy and applicable EO 12856 requirements and/or delegates certain authority to Commander, Naval Supply Systems Command (COMNAVSUPSYSCOM), Commander, Naval Facility Engineering Command (COMNAVFACENGCOM), major claimants, or others.

Identifies Navy opportunities for pollution prevention and facilitates transfer of pollution prevention technology.

Develops guidance for use by facilities in the development of facility Pollution Prevention Plans.

Develops and maintains an up-to-date pollution prevention technology transfer data base which can be used by facilities in accomplishment of pollution prevention goals.

Acts as the resource sponsor for the development of pollution prevention technology and as the assessment sponsor for accomplishing implementation of pollution prevention efforts at Navy facilities.

Area and Regional Environmental Coordinators:

These area and regional coordinators, such as, Commander in Chief, U.S. Pacific Fleet and Commander, U.S. Naval Base Seattle, respectively, help coordinate environmental issues on a geographic basis. They work closely with the Environmental Protection Agency and local regulatory agencies to ensure each Navy installation meets or exceeds regulatory requirements. The involvement of these commands helps to emphasize the important role that protection of the environment plays in accomplishing the Navy's mission. The Navy serves as the DOD Regional Executive Agent in EPA Regions I, III, and IX (see Appendix 'E' for a listing of the States contained within each region).

Commander, Naval Supply Systems Command (COMNAVSUPSYSCOM):

Assists CNO (N45) in managing the HM aspects of the Navy pollution prevention effort and serves as the overall manager for the supply aspects of the Pollution Prevention Program. Develops, implements, and maintains a Navy-wide system for acquiring only authorized HM, integrating command and shore facility HM Authorized Use Lists (AULs).

When requested, assists system command program managers by providing life-cycle costs for HM being considered for acquired systems. Reviews HM shelf life policies and determines the validity of shelf lives and/or unit of issue requirements. Reviews Defense Re-utilization and Marketing Service (DRMS) records for HM excess because of shelf life expiration.

Establishes methods to reduce/minimize the entry of new HM into the supply system. Prior to the introduction of new HM into the system, a valid requirement for the HM must exist; a complete MSDS must be locally available; and a review must confirm that existing non-hazardous or less hazardous substitutes are not available.

Commander, Naval Facility Engineering Command (COMNAVFACENGCOM):

Supports pollution prevention initiatives as tasked by CNO (N45). Assists CNO (N45) in managing the pollution prevention technology transfer data base. Through its Engineering Field Divisions and Activities, provides technical assistance to shore facilities to implement pollution prevention practices and incorporate pollution prevention technology into facility processes.

Develops plans for implementing the use of alternative fuel vehicles in Navy vehicle fleets.

Chief of Naval Education and Training:

Incorporates pollution prevention practices into Navy training. Source reduction initiatives shall be included into appropriate training courses.

Naval Facilities Engineering Service Center (NFESC):

Provides worldwide support to the Navy and DOD on specialized pollution prevention and environmental compliance issues. The products and services of the pollution prevention compliance division will be discussed in more detail in Chapter Six.

Major Claimants:

Major claimants are major commands that provide funding and support to Navy installations based on the installation's function and geographic region. They ensure that facilities under their command develop and implement Pollution Prevention Plans. In addition, they perform the following:

Program, budget, and allocate funds for all facility pollution prevention projects identified in facility Pollution Prevention Plans with payback periods of 3 years or less.

Assist COMNAVSUPSYSCOM in developing and maintaining a centralized list of authorized HM and approved, less hazardous substitutes. Ensure that facilities under their cognizance use only that HM which appears on each facility's HM AUL.

Develop and implement HM elimination/substitution processes for all systems and operations under their cognizance. These processes shall include the identification, evaluation, and use of the least hazardous material available.

Develop processes which ensure that the least hazardous technically acceptable materials are incorporated into the facility AUL.

Establish the contributions of each of their facilities (which meet the threshold reporting requirements of EPCRA Section 313 for the reduction in releases of toxic chemicals to the environment and the off-site transfer of toxic chemicals for treatment and disposal.

Commanders and commanding officers of shore facilities (bases):

Develop and implement a facility Pollution Prevention Program that incorporates Hazardous Material Control and Management (HMC&M) and hazard communication requirements.

Develop and implement a facility Pollution Prevention Plan. This plan shall address the actions required by the facility for reducing pollution from all sources and to all media and for meeting the facility's contribution to their major claimant's toxic chemical release reduction requirement. The plan shall also identify, to the major claimant for funding, all projects which have a payback period of less than 3 years and shall identify funding requirements for those projects.

Establish or revise as necessary, and implement, procedures to control, track, and reduce the variety and quantities of HM in use, in storage or stock, or disposed of as HW. Include in those procedures centralized HMC&M operations per the Navy Consolidated Hazardous Material Re-utilization and Inventory Management Program (CHRIMP) manual.

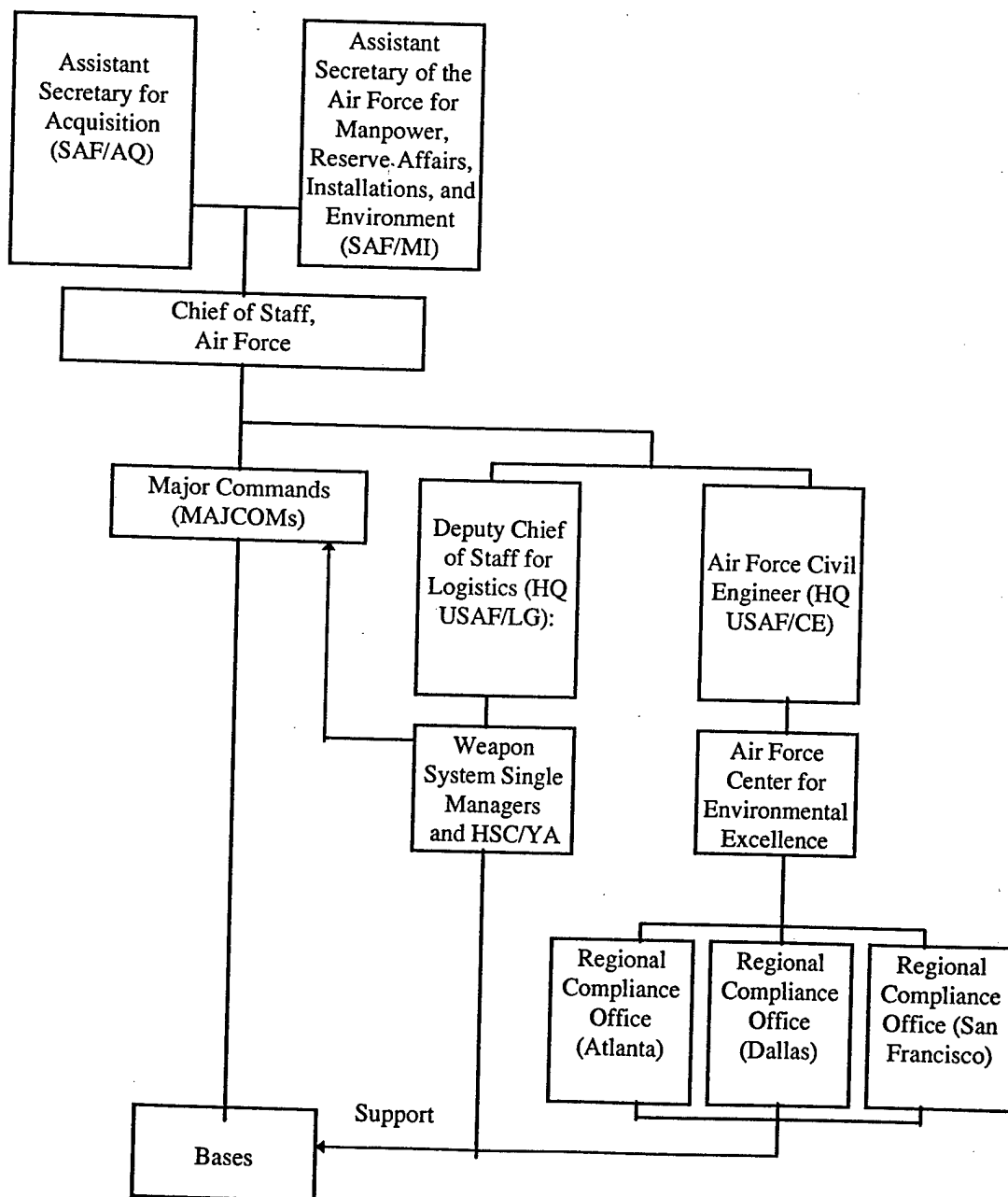
Develop or revise as necessary, and implement, a facility level HM AUL using an inventory that identifies and quantifies HM, including whether the material is an extremely hazardous substance, hazardous substance, or toxic chemical as defined under EPCRA.

Limit open market purchases of HM to purchases for which a stock numbered product is unavailable from the supply system and for which there is a valid controlling document (e.g., maintenance requirement card, maintenance requirement plan, technical manual, technical order, maintenance manual, or similar document). In cases where a standard stock item is deemed inferior, complete information regarding the item shall be provided to the supply officer in order that an HM AUL feedback report can be submitted to document the apparent deficiency.

Ensure facility level supply functions establish and implement a local shelf life control and management program.

4.3 The Organizational Structure of the Air Force P2 Program

The Air Force's primary environmental organization (Air Force Instruction 32-7080) can be broken down as depicted in the organization chart provided below. Specific pollution prevention responsibilities for these positions/organizations are detailed beginning on the next page. Additional positions/organizations not shown on this organizational chart are discussed as well.



Assistant Secretary of the Air Force for Manpower, Reserve Affairs, Installations, and Environment (SAF/MI):

Promulgates and oversees policy for the Air Force Pollution Prevention Program.

Assistant Secretary for Acquisition (SAF/AQ):

Institutes pollution prevention, including hazardous materials minimization and management into the system acquisition process through policies, procedures, training, contract provisions, and Federal Acquisition Regulation changes.

Chief of Staff, Air Force:

Implements Air Force pollution prevention policy and applicable EO 12856 requirements and/or delegates certain authority to the Air Force Civil Engineer (HQ USAF/CE), Deputy Chief of Staff for Logistics (HQ USAF/LG), major commands, or others.

Air Force Civil Engineer (HQ USAF/CE):

Develops policy, advocates for resources and oversees execution of the Air Force Pollution Prevention Program.

Deputy Chief of Staff for Logistics (HQ USAF/LG):

Institutes pollution prevention, including hazardous materials minimization and management into logistics processes through policies, procedures, and training.

Office of the Air Force Reserve (HQ USAF/RE) and National Guard Bureau (NGB/CF):

Implement pollution prevention for all Air Force Reserve installation and National Guard Bureau installations, respectively.

Air Force Center for Environmental Excellence (AFCEE):

AFCEE is the lead Air Force agency in providing installations technical services supporting the Air Force pollution prevention program. Services include: technology transfer, program management, recycling, affirmative procurement, hazardous material/waste reduction programs, conference/workshop management, audits, and contracting support. The role of AFCEE will be discussed more in Chapter Six.

Regional Compliance Offices:

Regional compliance offices help coordinate environmental issues on a geographic basis. They work closely with the Environmental Protection Agency and local regulatory agencies to ensure each Air Force installation complies with applicable laws and regulations. They serve as the DOD Regional Executive Agent in EPA Regions II, VI, and X and the Air Force Regional Coordinators in all EPA Regions (I through X). A listing of the States included within each EPA region is provided in Appendix 'E.'

Air Force Environmental Technology Support Center (ETSC):

The ETSC falls under the direction of Air Force Material Command and is located in McLean, VA. The ETSC mission statement notes that this group will gather, validate, analyze and disseminate state-of-the-art information on environmental innovative technology issues affecting the Air Force to researchers, program managers, and environmental planners so that customer-oriented products are the final result. The primary focus of the ETSC is on technical environmental issues that will impact the Air Force in the future environmental arena. Specific mission responsibilities are as follows: interface with Air Force activities to identify environmental quality technology needs; collect, substantiate, analyze and disseminate scientific and technical information on environmental quality; provide Air Force environmental input to Tri-Service Environmental Quality Strategic Plan; and interface with government agencies, academic institutions, and industries on environmental issues.

Focusing on providing state-of-the-art information to users on innovative technologies, the ETSC provides expertise in the following areas: industrial operations environmental compliance; hazardous waste minimization technologies; compliance auditing; program technology requirements and alternatives; compliance auditing; program

technology requirements and alternatives; data exchange and technology transfer initiatives; and development of long-term environmental quality technology trends analysis.

Air Force Civil Engineering Support Agency (AFCESA):

Provides pollution technical support to Air Force installations (non-weapon systems).

Weapon System Single Managers:

Weapons System Single Managers procure weapons under the supervision of the Air Force Material Command and in cooperation with the Human Systems Center-Acquisition (HSC/YA). These managers are required to reduce the use of hazardous materials in all phases of weapon systems development from concept through production, deployment and ultimate disposal, find alternative materials/processes, and measure their life cycle costs.

The managers must also reduce the use of hazardous materials in existing weapons systems by finding environmentally acceptable alternatives or processes and integrating them into technical orders, MILSPECs, and MILSTDs.

Air Force Material Command's Director of Engineering and Technical Management (HQ AFMC/EN):

Serves as the Air Force's Appropriate Technical Representative for ozone depleting chemical waiver-approval authority. Serves as the Ozone Depleting Chemical Waiver Focal Point and compiles waiver information.

Major Commands (MAJCOM) and Installations:

MAJCOMs and bases have the flexibility to manage their own pollution prevention programs. Integrated pollution prevention management (procedures, education, training, and funding) at MAJCOM level is vital to successful program execution.

MAJCOMs develop supporting directives to implement a pollution prevention program.

4.4 Conclusion

This chapter reviewed the organizational structure through which each Service manages their pollution prevention program. Without a basic understanding about how each Service's organization is arranged to implement a pollution prevention program, it would be difficult to comprehend the material presented in the remaining chapters.

The importance DOD places on pollution prevention is evidenced by the magnitude of manpower, funding, and time, each Military Department has put into developing their program. From the Secretary of Defense to the individual soldiers, sailors, marines, and airmen that serve in the Armed Forces, all members of the DOD team play significant roles in the daily success of the military's pollution prevention efforts. Continued efforts to consolidate resources and work jointly should only serve to improve upon the many achievements the U.S. Military has already accomplished.

CHAPTER 5: Tri-Service Strategies, Instructions, and Guidance

Now that the organizational structure through which each Service manages their P2 Program has been discussed, each Service's Pollution Prevention Program will be analyzed in detail. To gain an understanding of how the programs are run, a review of key concepts contained in each Service's strategies, instructions, and guidance is in order. This chapter will explain some of the specific program elements of the three Military Department's P2 Programs. The strategies, instructions, and guidance of each Military Service, concerning implementation of a P2 Program, are built upon the laws, executive orders, and DOD guidance that were discussed in Chapters Two and Three.

5.1 The Army P2 Program Description

Background:

The following text is taken from a Headquarters, Department of the Army letter dated January 19, 1994 that issued formal guidance concerning the Army's Pollution Prevention Program.

The Army is committed to environmental leadership. While the Army has made significant gains in environmental protection, it needs an "expansion of focus" in order to continue that trend. The Army must work harder to prevent all forms of pollution and waste before they occur. Controlling existing environmental problems or cleaning up after the fact is no longer sufficient.

The Army is spending over a billion dollars annually for an environmental management program that is pollution control and clean-up oriented. Initiating a prevention-oriented approach, then gradually shifting the primary focus of environmental management to prevention, is the only way these costs can be limited or reduced in the future.

In order to achieve compliance with environmental regulations when Army environmental programs began, almost all the management effort was either on end-of-pipe pollution treatment and control or on clean-up of contaminated sites. While the Army is meeting this original environmental compliance goal, the quest for improved

environmental quality has proven to be more complex than initially thought. *The Army has learned that when the focus is controlling and treating waste, rather than preventing waste, new environmental problems tend to overtake whatever progress is made.*

To apply this lesson learned, the Army has identified pollution prevention as one of four critical elements, or "pillars," of the Army's environmental program. Pollution prevention efforts must be coordinated Army-wide and integrated with the overall environmental program as well as with all program or installation activities with the potential to pollute. This integration is consistent with the Pollution Prevention Act of 1990. Pollution prevention is intended to reduce (or eliminate) the impact that an operation or activity may have on the total environment (including impacts to the air, surface waters, ground waters, and soils) through reduction (or elimination) of wastes, more efficient use of raw materials or energy, and/or reduced emissions of toxic materials to the environment.

Army References:

- AR 200-1, Environmental Protection and Enhancement
- AR 200-2, Environmental Effects of Army Actions
- AR 385-10, The Army Safety Program
- AR 385-16, System Safety Engineering and Management
- AR 420-46, Water Supply and Wastewater
- AR 420-47, Solid and Hazardous Waste Management
- AR 420-74, Natural Resources: Land, Forest and Wildlife Management
- AR 420-76, Pest Management
- AR 70-1, Army Acquisition Policy
- AR 700-127, Integrated Logistics Support
- AR 700-141, Hazardous Material Information System (HMIS)
- FM 100-22, Army Field Manual
- Policy and Guidance for Identifying U.S. Army Environmental Program Requirements, RCS 1383 Report, July 1993.
- Army Environmental Center, Commander's Guide to Environmental Management, June 1993.
- TM 5-634, Solid Waste Management.
- TM 38-410, Storage and Handling of Hazardous Material.

Mission:

To organize, train, and equip active duty and reserve forces for the preservation of peace, national security and defense. The Army's mission focuses on land operations. In addition, the Army administers programs aimed at

protecting the environment, improving waterway navigation, flood and beach erosion control, and water resources development.

Environmental Strategy:

The Department of the Army has an extensive pollution prevention program, which is focused on Army acquisition, industrial, logistical, and base operations. Pollution prevention activities, including policy and program development, are ongoing at all levels and are integrated with DOD programs.

The Army formally established its Pollution Prevention Program in November 1992 with the publication of the "The U.S. Army Environmental Strategy into the 21st Century." This strategy established pollution prevention as one of the four pillars of the Army Environmental Program. An introduction to the Strategy and the sections pertaining to pollution prevention follow.

The U.S. Army Environmental Strategy into the 21st Century defines the Army's leadership commitment and philosophy for meeting present and future environmental challenges. It provides a framework to ensure that environmental considerations are integral to the Army mission and that an environmental stewardship ethic governs all Army activities. The strategy provides a unity of direction and a cohesive structure for all Army activities associated with Army installations, facilities, training areas, as well as acquisition, manufacturing, industrial operations and activities, and for the Army's civil works mission.

This strategy takes its direction from a vision and consists of goals, objectives, and an implementation plan. The Army's environmental vision is to be a national leader in environmental and natural resource stewardship for present and future generations, as an integral part of all Army missions. The strategy's goals and objectives provide the mid-term and long-term actions necessary to achieve the vision and form the basis of an Eight-Year Action Plan. This action plan corresponds to the military budgeting and programming cycles and implements the goals and objectives.

The Army's environmental strategy provides the necessary direction to attain the environmental vision. The strategy consists of specific goals, objectives, and an implementation or action plan. The strategy harnesses the strengths of the Army -- command leadership, organization, and commitment to purpose -- to achieve environmental stewardship by wisely using and managing environmental resources. In so doing, the Army recognizes its responsibility to the United States and the world to protect the environment.

The Army environmental strategy is focused on four pillars to form a sound environmental program. These pillars are compliance, restoration, prevention, and conservation. To be on a firm foundation, these pillars require the Army to build on its core competencies and develop an integrated approach. This includes six critical elements: commit the chain of command, organize for success, spread the environmental ethic, train and educate the force, prioritize Army resources, and harness market forces.

In addition to a firm foundation and an environmental ethic extending throughout the total force, the Army's objective is to ensure the four pillars are balanced. Environmental stewardship must be built into everything Army soldiers and civilians do to improve performance of the Army's national defense and civil works missions. This includes: giving immediate priority to sustained compliance; continuing to restore previously contaminated sites as quickly as resources permit, focusing efforts on proactive pollution prevention to reduce or eliminate pollution at the source, conserving and preserving natural and cultural resources so they will be available for present and future generations to use.

This strategy is intended to enhance the Army mission, reduce the Army's direct cost, and eliminate future cost to the Army, the nation, and the environment. The Army's pollution prevention pillar is discussed in the following paragraph.

Prevention

The prevention pillar focuses on eliminating pollution to the greatest extent possible. This includes reducing hazardous materials use and hazardous waste generation. All phases of the materiel management life-cycle from cradle-to-grave are included. Prevention is generally achieved in a hierarchical process, starting with source reduction. The amount of waste generated is reduced by changing process inputs, seeking environmentally acceptable or less toxic material, or increasing efficiency by reusing materials and by-products and by treating residuals prior to discharge. In the long term, proactive prevention requires instilling an environmental ethic that will change behavior across the Army and help to avoid future compliance and restoration problems.

Army Pollution Prevention Policy and Goals:

Pollution prevention, in concert with the conservation of natural and cultural resources, is the Army's preferred approach to environmental management and maintaining compliance with environmental laws or regulations. When alternative approaches (e.g., prevention or control) are available to deal with an environmentally degrading operations, preventive measures must be used unless mitigating circumstances (e.g., excessive cost, time, or technology limitation) exist and can be documented.

P2 shall be used to complement, and eventually replace (to the maximum extent possible), the traditional pollution control and clean up orientation in existing Army environmental program management. The requirement to prevent pollution applies to all Army missions and operations, to include the National Guard and Army Reserves (Enviro\$en\$e 1996).

The Army's pollution prevention focus includes:

- Use a holistic approach to pollution prevention which looks at all environmental media collectively.
 - Establish an investment strategy to fund the Pollution Prevention Program.
 - Establish pollution prevention partnerships with industry, the public, and special interest groups.
 - Acquire world class pollution prevention technology and capability, and distribute it Army-wide.
 - Reduce energy use, maximize energy efficiency, and reduce pollutants from energy and fuel sources.
- Systematically eliminate hazardous materials use and operations or processes that produce hazardous/solid waste and other emissions.
 - Meet DOD goals on HW and SW reduction at installations and GOCOs.
 - Reduce or eliminate hazardous or environmentally unacceptable materials in new weapon system acquisition programs.
 - Reduce or eliminate hazardous or environmentally unacceptable materials in existing weapon systems management.
- Minimize environmental risks to operating personnel and visitors at Army civil works facilities.
 - Adopt operating procedures for all equipment which reduce or eliminate waste.
 - Communicate environmental values to visitors at all project sites.
 - Establish and apply rules which meet national environmental, health, and safety standards.
- Instill a pollution prevention ethic throughout the entire Army community and all mission areas.
 - Obtain command support and involvement.
 - Integrate environmental health and safety concerns into all Army operations and activities.
 - Develop multi-directional, open communications through comprehensive public affairs planning.

The Army's primary pollution prevention goal is to reduce reliance on products or processes that generate environmentally degrading results as near to zero as feasible. In accordance with Executive Order 12856, the

Army's goal is to reduce its total releases of toxic pollutants to the environment (and off-site transfers for treatment and disposal) by no less than 50 percent prior to 31 December 1999 (compared to a total release baseline year established not later than December 1994). Consistent with the Pollution Prevention Act and Army waste management policy, reductions should be achieved through source reduction to the maximum extent possible. To accomplish this: pollution prevention principles and technologies will be incorporated throughout all life-cycle phases in the acquisition of new weapon systems, from conception through the ultimate use and disposal of the system, system components, materials, and wastes. Contractors will be required to develop and implement effective and comprehensive pollution prevention plans in all future systems acquisition programs. Pollution prevention approaches will also be developed under existing acquisition programs, to include consideration of contractor incentives.

Pollution prevention principles and technologies will be incorporated into the management and logistics support of existing weapon systems and modifications to those systems. Programs, to include contractor incentives, will be established to eliminate or reduce the use of hazardous or toxic substances in current and future maintenance contracts. Current standardized documents (e.g., military specifications and standards), will be reviewed and revised to incorporate substitutions to minimize hazardous or toxic substances specified in these documents. Material management practices will be improved to minimize the quantities and types of hazardous materials requisitioned (to include compatibility requirements), stored, and used on Army installations. Facilities management practices for storing hazardous materials will be improved to prevent waste and pollution resulting from shelf-life expiration, inadequate containment, and weather damage problems.

Multi-media pollution prevention opportunity assessments will be conducted and pollution prevention plans established at all Army installations. Such plans will identify an approach to reduce all adverse environmental impacts (not just those impacts resulting from waste generation). Further, the plans will identify resource needs, an implementation schedule, milestones, success measurement criteria, cost benefits, and implementation barriers. Plans will also address emergency operations and safety and health requirements.

Multi-media Pollution Prevention Programs will be established at all Army installations. These programs will implement the Pollution Prevention Plans. For all Army requirements, the use of recycled materials (i.e., materials

derived from post-consumer or agricultural waste, industrial scrap, or other recyclable items) will be favored. Toxic Release Inventory (TRI) reporting will be accomplished in accordance with EO 12856.

Pollution prevention principles will be incorporated into Army operations and training. Pollution prevention will be incorporated into doctrine and plan development at all levels. All logistical activities (supply, maintenance, transportation, facilities, and services) will incorporate pollution prevention. Infrastructure planning, construction, renovation, and demolition will include pollution prevention measures throughout the infrastructure life-cycle. Base operations will include pollution prevention as a standard feature of all installation support activities.

Pollution prevention will be integrated into health and medical activities to the greatest extent possible. Pollution prevention will be planned for and incorporated into all phases of contingency operations; mobilization, deployment, operations, re-deployment, and demobilization. Research, development, test, and evaluation (RDT&E) activities will also incorporate pollution prevention measures.

Pollution prevention will be incorporated into all Army industrial operations as a permanent long-term goal. Pollution prevention will be a planning factor in all Army energy plans and programs. Army commitment to this pollution prevention policy is intended to accomplish the following goals:

- Reduce or avoid future operating costs and liability associated with environmental cleanup and compliance, as well as from unnecessary generation of waste.
- Avoid disruption of mission operations due to regulatory compliance problems.
- Address difficult-to-control sources of pollution that do not lend themselves readily to a regulatory control approach.
- Further advance national environmental policy.
- Demonstrate environmental leadership by correcting the root cause of environmental degradation rather than treating the symptoms of environmentally damaging activity.
- Foster development of the environmental ethic through voluntary partnerships at all organizational levels with industry, communities, regulators, and private environmental advocacy organizations.
- Reduce the cost of base operations through improved process efficiencies and materials/energy utilization.
- Reduce the cost of weapon system RDT&E, procurement, operation, and disposal.
- Educate the total Army community -- commanders, managers, civilian/military work force, and families -- about the environmental consequences of decisions and actions.

As a critical program management element, planning and execution of the Pollution Prevention Program will be integrated with the total Army Environmental Management Program to ensure consistency with overall program goals. The program affects the total Army community, and incorporates the following elements:

- Impacting the total weapon system (including munitions manufacturing) life-cycle so that: reliance on products or processes that generate environmentally degrading impacts is reduced to as near zero as

possible; hazardous and environmentally unacceptable substances are used or produced minimally; and pollutant creation is held to the minimum practicable.

- Reducing generation of all hazardous and non-hazardous solid, liquid and gaseous wastes, emissions, or releases.
- Increasing the percent/amount of recyclable material diverted from the municipal waste stream.
- Improving on-site cleanup and maintenance processes.
- Selectively procuring non-hazardous materials rather than hazardous materials whenever practical.
- Proactively requiring the procurement of reusable, recyclable, and recycled materials, maximizing recycled content.
- Selecting clean and efficient power/energy sources and supplies.
- Improving conservation of natural resources.
- Protecting endangered species habitats that are part of or near Army installations by reducing the adverse environmental impacts of Army mission operations and activities.
- Implementing Army-wide water conservation procedures.

Some Army installations host tenants from other Services and other Federal Agencies whose operations must be integrated into the installation's pollution prevention program. Overseas, Army installations must conform to host-nation pollution prevention and waste management practices. Early coordination with all who generate waste on or receive waste from Army installations will assist in program implementation. Overseas Army installations are encouraged to go beyond host-nation pollution prevention practices wherever feasible. The overseas installations should adhere to the EPA management hierarchy wherever possible.

Army-wide Program Elements:

As stated, the Army pollution prevention program examines all environmental media, and has as its primary objective the elimination of hazardous material usage and hazardous waste producing operations and processes. The program has an emphasis on reducing energy use, maximizing energy efficiency, and reducing pollutants from energy and fuel sources.

Components of the program include: ODC replacement, recycling, friendly packaging, green buildings, executive order compliance, medical programs, acquisition, and logistics. A significant effort is underway to implement pollution prevention technologies in Army Depot level manufacturing and maintenance operations.

The Army is expanding its pollution prevention Research, Development, Test, and Evaluation (RDT&E) program, and is broadening Department of the Army staff involvement in pollution prevention. The Army has published a "Materiel Developer's Guide for Pollution Prevention," and is planning to publish a second edition.

Major commands (MACOMs) within the Army, as well as installations, manage their own pollution prevention programs under broad policy guidance from Department of the Army. Pollution prevention opportunity assessments and training have been conducted at most Army facilities.

Top level management initiatives for Pollution Prevention include the development of Army-wide pollution prevention guidance, periodic meetings of pollution prevention proponents, a pollution prevention award program with monetary incentives, and an Army-wide mechanism for tracking pollution prevention expenditures.

Senior Army leadership has recognized that the long term effectiveness of pollution prevention efforts will be determined, ultimately, by the degree of integration with Army planning and financial management systems. This program integration has its foundation in the Army's Environmental Strategy into the 21st Century. The translation of policy into a broad Army program with a carefully designed investment strategy is under study and should lead to a coordinated, measurable, and systemic approach to pollution prevention Army-wide. The Army's approach to program integration is described below.

Planning Environmental Resource Strategy Evolution and Utilization Study (PERSEUS)

The purpose of the PERSEUS study is to use pollution abatement and prevention analysis (PAPA) methodology to formulate and analyze investment strategies that support Army environmental policy and program requirements. The PAPA investment methodology uses a multi-objective, mathematical programming model to maximize pollution reduction, cost savings and energy savings, and to minimize investment and life-cycle costs.

The study will be conducted in two phases: During Phase 1, the PAPA methodology will be used with an initial data set to allow early support of the Program Objective Memorandum (POM) build. The data set was prepared on an expedited basis, from the most immediately accessible pollution prevention opportunity (PPO) and energy conservation opportunity (ECO) data. During Phase 2, the PAPA methodology, with a revised data set, will be used for ongoing POM support. The revised data set will incorporate adjustments and additions to the initial data set.

The investment strategies will identify PPOs and ECOs by type, number, installation and fiscal year (FY) of acquisition. The strategies will consider off-the-shelf PPO/ECO technologies, and will address FYs 1994-2005 initially. Additional FYs will be included as appropriate. The study will consider Army installations in the United States, including the Army Materiel Command, Forces Command, and Training and Doctrine Command.

The objective of the study is to develop a PPO data base for Army installations in the United States, and to apply the PAPA investment model to generate and analyze pollution prevention investment strategies in response to DOD guidance.

The study, when completed, will develop and evaluate investment strategies, or families of procurements, which will support the Pollution Prevention Act, the Energy Policy Act, and Executive Orders 12856 and 12902. It will provide an analytical base appropriate for measuring the environmental component of installation readiness.

Technological Innovation

Technological innovation can make immense contributions to pollution prevention. To enhance and accelerate Army pollution prevention efforts, the Army seeks out and evaluates new technologies which have the potential to prevent unnecessary generation of pollution at Army activities.

Hazardous Waste Minimization Program

Pollution prevention is an extension of the Army's Hazardous Waste Minimization (HAZMIN) program. Army activities such as manufacturing, testing, maintenance, research, development, and medical surveillance all produce a variety of pollutants. Pollution prevention means avoiding the release of these pollutants to all areas of the environment: air, water, and the land. Hazardous waste disposal, water discharges, and air emissions have all been associated with significant environmental contamination. Cleaning up past contamination has already cost DOD several billion dollars (Dycus, 1996).

The cost of complying with current waste disposal regulations, wastewater treatment standards, and air pollutant emissions limits continues to rise. Current environmental regulations and Army policy make pollution prevention an integral part of their overall strategies for protecting health and the environment.

In 1987, the Army set a goal to reduce routine hazardous disposal 50% between 1985 and 1992. As of 1991, the Army exceeded this goal. Using 1992 disposal rates as a new baseline, the Army hopes to achieve another 25% reduction by 1995 with an additional 20% by 1999. In addition, the Army plans to reduce solid waste disposal and air emissions significantly over the next few years.

Toxics Reduction in the Military

DOD is working with the EPA to reduce the use and release of hazardous materials. Elements of this include a review of Military Specifications (MILSPECs) to determine the for various hazardous substances. The program will eventually establish DOD goals for reduction in the procurement and use of research hazardous materials.

Army commanders should establish a HAZMIN program and survey their facilities to determine the sources, types, and amounts of hazardous waste generated, air and water pollutants released, and solid waste disposed.

Acquisition

To insure that pollution prevention is built into the entire process by which weapons systems are procured, the Army has taken proactive measures to make the acquisition community aware of the need to integrate pollution prevention as early as possible, and as completely as possible, into the acquisition process. This integration provides a systemic pollution prevention approach to acquisition, insuring long-term reductions in pollution.

The following includes excerpts from the executive summary of the second edition of the "Materiel Developer's Guide for Pollution Prevention," which is published by the Army Acquisition Pollution Prevention Support Office. This second edition of the "Materiel Developer's Guide for Pollution Prevention" is intended to provide the Army Materiel Developer (MATDEV), with the up-to-date information needed to develop, implement, and manage an effective acquisition pollution prevention program.

Incorporating pollution prevention into the acquisition decision making process is not expensive or difficult. In fact, implementing an effective acquisition pollution prevention program will help reduce program life-cycle costs and mitigate environmental impacts. Throughout the second edition guide, examples of commercial firms (including military contractors) that have implemented pollution prevention programs and reduced life-cycle costs are presented. These commercial success stories are discussed relative to potential U.S. Army acquisition program applications.

The "front of the pipe" nature of many pollution prevention decision making opportunities requires some system performance analysis in addition to economic analysis. The second edition guide provides a MATDEV-level overview of the process by which environmentally acceptable substitutes for hazardous materials are identified and incorporated in the acquisition program. The MATDEV-level performance analysis overview includes a summary of

key issues and provides the information needed to assemble and train a support staff that can effectively handle complex technical issues.

The most important change between the contractual guidance presented in the first edition guide and the second edition is the use of National Aerospace Standard (NAS) 411, "Hazardous Materials Management Program," as a DOD contract tool. DOD and the Army have endorsed the use of NAS 411 as the primary means of including pollution prevention requirements in contract packages.

Life-Cycle Environmental Guide for Weapon System Project Managers

The development and fielding of Army Weapon Systems requires effective management of complex environmental issues. The "Life-Cycle Environmental Guide for Weapon System Project Managers" is intended to provide the Project Manager (PM) with a general framework for successfully executing the acquisition regulatory and statutory requirements. Although not intended to be a pollution prevention documents, the guide contains both a section on pollution prevention and a detailed system development plan which could enable planners to integrate pollution prevention into all phases of the systems acquisition process.

The guidebook consists of three sections: Section I is a brief primer which explains the complex environmental arena the PM will encounter. Section II describes the life-cycle procedural requirements. Environmental requirements are listed according to each milestone/phase. Section III contains a synopsis of the major national environmental laws, and provides an overview of regulatory requirements that can impact weapon programs.

Installation Program Elements:

Installation management is an enormous responsibility of Army commanders. As the Army environmental program matures, a developing body of Army environmental doctrine is being promulgated to the field. The following information appears in the Army Field Manual (FM) 100-22, which was published on October 11, 1994. It represents the Army's pollution prevention doctrine for the operation of installations.

Installation Pollution Prevention Program

The objective is to adopt and implement integrated management approaches, procedures, and operations in all Army mission areas. This is to conserve and reduce the consumption of resources. In addition, the environmental contamination and pollution resulting from water usage and solid waste generation should be minimized. The policy is to:

- Conserve water and other natural resources.
- Minimize or eliminate sources of pollutants to the air, land, surface or ground water due to water usage and solid waste generation.
- Demonstrate leadership to attain national goals set for controlling water pollutants.
- Conserve and recover resources.
- Reuse or recycle materials that normally enter the solid or liquid waste stream.

Hazardous Waste Management Program

The hazardous waste management objective is to manage hazardous waste to promote the protection of public health and the environment. The policy is to: 1) substitute non-toxic, non-hazardous materials for toxic/hazardous ones; 2) ensure compliance with local, state, and federal hazardous waste requirements; 3) ensure waste management practices that include generation, treatment, storage, disposal, and transportation are managed to protect public health and the environment; 4) reduce the need for corrective action through controlled management of solid and hazardous waste; 5) report all instances of noncompliance; 6) track hazardous material and waste from initial detection to final resolution; and 7) minimize purchase of hazardous material.

Solid Waste Management Program

The objective is to manage the generation, collection storage, processing, treatment, and disposal of solid waste in compliance with federal, state, and local environmental laws and regulations, by using an integrated management approach to arrive at the most cost-effective and environmentally safe procedures. Army installations should minimize the generation and disposal of solid wastes by actively encouraging and participating in source reduction, reuse, recycling and composting programs. Installations will develop and maintain Affirmative Procurement programs for acquiring recyclable and recycled content products.

Program Accomplishments:

The Army's pollution prevention program has achieved the DOD hazardous waste minimization goal of a 50% reduction in hazardous waste generation, using a 1987 baseline. The Army continues to seize opportunities to prevent pollution by eliminating wherever possible requirements and processes which contribute to pollution. As an example of program success, the Army Depot Systems Command (part of the Army Materiel Command) won the Environmental Protection Agency's Administrator's Award (Federal Category) in 1992 for its hazardous waste minimization program.

Army operations are diverse in nature and geographically dispersed. Army activities, installations, and MACOMs have implemented a variety of successful pollution prevention activities; these activities are ongoing and continue to reduce the amount of pollutants generated. A brief selection of these activities follows (Enviro\$en\$e 1996).

- In August 1991, the Army signed a Tidewater Interagency Pollution Prevention Program (TIPPP) Memorandum of Understanding (MOU) to establish a policy of cooperation in the Chesapeake Bay region. The Army joined with the Navy, Air Force, NASA, and EPA on this MOU to formalize service and agency roles and responsibilities, and establish a framework for implementing pollution prevention projects and initiatives at TIPPP facilities. The TIPPP is a component of EPA's Model Community Pollution Prevention Program (MCPPP), and originated as part of the EPA/DOD Chesapeake Bay Agreement signed in April 1990. The TIPPP develops innovative pollution prevention technologies and facilitates technology transfer among the services and agencies.
- An innovative idea for recovering heat lost from boiler plants was demonstrated at the Louisiana Army Ammunition Plant. The Teflon-covered heat exchangers will have a payback in 5.2 years. This process saved the plant \$13,300 in FY88 and has potential for wide application to military and civilian boiler plants.
- In November 1991, the Assistant Secretary of the Army for Installations, Logistics and Environment signed a memorandum announcing the Secretary of the Army Hazardous Waste Minimization Incentive Awards Program. This program recognizes, with monetary rewards, installations and individuals who make significant contributions to reducing the hazardous waste generation rates. First prize at the installation level can equal \$250,000. Both military and civilian individuals can receive up to \$10,000.
- Fort Benning received more than \$1.2 million and Fort Hood received more than \$750,000 in FY91 for their recycling programs. The Army as a whole received more than \$12.7 million in FY91 from recyclable material processed through the Defense Re-utilization and Marketing Service.
- The Army has programs in place to replace chlorinated solvent cleaning used in maintenance processes with high-pressure water blast. Facilities that installed the system achieved cost avoidance savings of approximately \$656,000 annually.
- Staff at Red River Army Depot, Texas, found that they can eliminate the Depot's chromate conversion coating process by relying on abrasive blasting to pre-treat aluminum surfaces prior to painting. Quality assurance/quality control studies indicate no differences for test panels pretreated with and without the chromate conversion coating process. Depot staff estimate that eliminating the need for chromate conversion coating will save the Depot approximately \$195,000 a year. If the Depot had not switched to abrasive blasting, the Depot would have had to install scrubbers and other emission control equipment to meet the requirements of the 1990 Clean Air Act Amendments at a cost of \$4 million.

- Holston Army Ammunition Plant, Tennessee, converted from a sodium nitrate process used in ammunition production to an ammonium nitrate process. This change converted a regulated waste stream to a by-product stream that is being successfully marketed, thus eliminating a major hazardous waste disposal problem.
- Iowa Army Ammunition Plant is using a process to regenerate carbon contaminated by explosive materials off-site and return it for re-use rather than incinerating the contaminated carbon. The program substantially reduces the amount of new carbon purchased, eliminates the need to treat approximately 10,000 pounds of carbon each year in the explosive waste incinerator, and eliminates the need to dispose of 40 to 60 drums of contaminated carbon per year as hazardous waste.
- Vint Hill Farms Station, Virginia, uses a high-tech, ultra-violet system to disinfect sewage without using chemicals that might harm the Chesapeake Bay. The system eliminates the need to use several hazardous substances.
- Fort Carson, Colorado, eliminated a waste stream, reduced fugitive air emissions, and reduced cross-contamination at a heavy equipment maintenance facility for armored units by installing jet-washers for parts cleaning. The use of the jet-washers eliminated a toxic chemical waste stream of nearly 30,000 pounds per year.
- The Army and the National Defense Center for Environmental Excellence (NDCEE) are working on eliminating halogenated metal parts cleaning solvents that contain Chlorofluorocarbons (CFCs) and the toxic chemical 1-1-1 trichloroethane. The Army uses halogenated metal parts solvents extensively throughout its weapon system maintenance programs. Preliminary testing of aqueous cleaners as a replacement for halogenated solvents has shown success.
- Letterkenney Army Depot, Pennsylvania, initiated a program to eliminate wash primers the Army uses to prepare steel substrates for epoxy primer. Studies indicated that abrasive blasting could be used as an alternative for the wash primers which contain chromate bearing hazardous air pollutants and release high amounts of volatile organic compounds. Letterkenney staff estimate that if the depot continues to use the wash primers, the depot will have to purchase a \$3.4 million paint booth to comply with Pennsylvania's environmental regulations.
- The National Guard Bureau purchased plastic media blasting equipment to replace chemical paint strippers used on aircraft and ground mobile vehicles. The estimated annual savings in reduced disposal costs are \$370,000.
- The Maryland Army National Guard Combined Support Maintenance Shop reduced the volume of hazardous waste generated by 22,000 pounds. Through the purchase and use of oil and fuel filter crushing machines, an antifreeze recycling machine, and a refrigerant recovery and recycling machine, the Combined Support Maintenance Shop saved \$70,000 per year in labor and reduced disposal fees.

5.2 The Navy P2 Program Description

Background:

EO 12856 requires DOD and the Navy (remember the term "Navy" includes the Marine Corps throughout this report) to conduct its facility management and acquisition activities so that, to the maximum extent practicable, the quantity of toxic chemicals entering any waste stream, including releases to the environment, is reduced as expeditiously as possible through source reduction; that waste that is generated is recycled to the maximum extent practicable; and that any wastes remaining are stored, treated, or disposed of in a manner protective of public health and the environment.

"Pollution Prevention is a win/win strategy (NRL 1996)." Navy engineers and managers are working daily with DOD experts and contractors to research, develop, test, demonstrate, and deploy the best technologies available to do the job. The Navy's vision of the future must enable it to determine which programs and technologies should be implemented and supported, and thus allow the Navy to operate worldwide in harmony with the environment.

The size of the Department of the Navy (DoN) is a significant factor in the planning process of its P2 Program. In 1995, DoN comprised 5,400 aircraft, 378 ships, more than 3,000 ground combat vehicles, and more than 250 shore facilities (NRL 1996). It currently employs over 770,000 military and civilian personnel worldwide. The DoN is cutting its expenses by lowering disposal costs and procuring less hazardous material (HM). In addition, the Navy is realizing considerable savings in operational costs by conserving energy and resources.

Navy References:

- OPNAV 45-120-10-94, Navy Shore Installation Pollution Prevention Guide
- OPNAVINST 6250.4A, Pest Management Programs
- OPNAVINST 4110.2, Hazardous Material Control and Management (HMC&M)
- OPNAVINST 5090.1B, Environmental and Natural Resources Program Manual
- OPNAVINST 5100.23D, Navy Occupational Safety and Health (NAVOSH) Program Manual
- NAVFAC P-73, Vol. II, Natural Resources Management Procedure Manual
- NAVSUPSYSCOM Manual, Consolidated Hazardous Material Re-utilization and Inventory Management Program (CHRIMP)
- NAVSUPINST 4110.528, Shelf Life Item Identification, Management and Control
- NFESC UG-2000-ENV, Solid Waste Management Plan Guide
- NFESC UG-2003-ENV, Qualified Recycling Program Development Guide
- U.S. Navy Commanding Officer's Guide to Environmental Compliance, September 1995

Mission:

Be prepared to conduct prompt and sustained combat operations at sea in support of national strategy. The Navy and Marine Corps must fight when necessary and so must train with, carry, and maintain the armaments and weapons to do so decisively.

Environmental Strategy:

The Navy shall take action to prevent pollution and to decrease the release of pollutants into the environment to amounts achievable. The Navy's Environmental, Natural and Cultural Resources Program Goals, as stated below, have been issued by the Chief of Naval Operations and the Secretary of the Navy. Although the primary mission of the Navy is national defense, the Navy is committed to protecting the environment and conserving natural resource heritage. The Navy has adopted the following environmental, natural and cultural resources quality goals.

Demonstrate leadership in the Federal sector by ensuring compliance with Federal, state and local environmental and natural resources laws and regulations. Promote an environmental protection and natural resources stewardship ethic within the Navy work force. This ethic will be fostered through the issuance of clear, understandable guidance, by providing suitable training for all levels of the chain of command, and by executive level commitment.

Pollution will be prevented at Navy activities. This will include: the development of environmentally sound ships of the 21st century; integration of pollution prevention into all acquisition/procurement processes; implementation of a vigorous hazardous material control and management program designed to reduce the overall use of hazardous materials within the Navy; and elimination of using ozone-depleting substances within the Navy. Clean up will be performed at Navy shore activities at which past waste disposal practices have resulted in the potential for contamination of ground water and adverse health effects to the general population. This effort shall be accomplished under the Installation Restoration Program on a "worst to first" basis.

The Navy will provide for the stewardship of natural resources and historical and archeological artifacts located on Navy activities. The stewardship of natural resources will include resource conservation. There will be no overall net loss of wetlands, and the Navy will increase the function and value of wetlands on its property. Archeological and historic preservation requirements and the planning and management activities are to be integrated to encourage practical, economically feasible rehabilitation and adaptive use of National Register properties.

The overall Navy environmental approach is to move the solution further "up the pipeline," to ensure that the materials and processes used to manufacture, operate, and maintain mission systems will reduce both environmental impact and life-cycle costs.

Navy Pollution Prevention Policy and Goals:

The Department of the Navy's environmental program focuses on five areas: cleanup, compliance, conservation, pollution prevention, and technology transfer (Enviro\$en\$e 1996). The Pollution Prevention (P2) program prevents pollution at the source. The program consists of five distinct efforts: outreach and awareness, acquisition and base level P2, energy conservation, hazardous material and hazardous waste minimization, and P2 research and development. Pollution prevention is the primary means for the Department of the Navy to reach compliance with environmental requirements and preserve access to the sea, air and land.

In the Navy, proactive pollution prevention requires instilling an environmental ethic that will change behavior and help avoid future compliance and restoration problems. A Navy installation must develop and implement a Pollution Prevention Plan. This plan must include the results of a shop by shop survey of all processes that use hazardous materials and generate pollutants. The plan must also contain specific measures for P2, based on the survey, and identify milestones and those responsible for milestone completion. This plan must be updated regularly as pollution prevention measures are put in place to help the installation meet its reduction goals.

Navy facilities which meet the threshold reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA) and which are not scheduled for operational closure by 31 December 1997 shall take action to reduce the releases of toxic chemicals to the environment and the off-site transfer of such toxic chemicals for treatment and disposal. The Navy goal is to reduce such releases and off-site transfers by at least 50 percent by 31 December 1999.

Specific goals of the Navy's Program, as listed in the Navy Commanding Officer's Guide to Environmental Compliance (NFESC 1995), include the following:

- Develop Pollution Prevention Plans at every facility not scheduled for operational closure by 31 December 1997. This plan should have addressed actions required to reduce pollution from all sources and should have been developed by the end of 1995.
- Reduce the quantity of toxic pollutants disposed or transferred off-site through process modification, recycling, reuse, material substitution or equivalent. Reduce the release or off-site transfer of hazardous waste by 50 percent by 1999 using 1994 as the baseline year as measured by the Hazardous Waste Annual Status Report. Decrease the releases of EPCRA toxic chemicals by 50 percent by 1999 using 1994 as the baseline year measured by EPCRA reporting.
- Reduce the amount of hazardous material (HAZMAT) used and hazardous waste generated by HAZMAT control in procurement, supply, and use.

- Institute a Consolidated Hazardous Material Re-utilization and Inventory Management Program (CHRIMP) at all naval activities to more efficiently use and better control HAZMAT at the activity level.
- Develop and incorporate new technology or materials which have a reduced impact on the environment, are safer and healthier to use, or result in reduced pollutant emissions.
- Incorporate pollution prevention into the design of new and modification to existing weapons, support systems, and facilities.

Navy-wide Program Elements:

The Navy Environmental Leadership Program (NELP)

The NELP is an important part of the DoN's Pollution Prevention Program. The Navy established Naval Air Station North Island and Naval Station Mayport as test beds for new shore installation P2 plans, technologies, advancements, procedures, and management initiatives. These NELP bases provide a single location for test and evaluation of new technologies, and for demonstration of proven P2 technologies for transfer Navy-wide.

Consolidated Hazardous Material Re-utilization and Inventory Management Program (CHRIMP)

The CHRIMP is a Navy life-cycle management program based on centralized control and cradle-to-grave management of hazardous materials. Under CHRIMP, every shore facility and ship inventories the locations, kinds, and amounts of HM and establishes a central point for procuring, storing, issuing, reissuing, and eventually disposing of HM as hazardous waste. This process has resulted in higher efficiency in maintenance activities and lower costs. CHRIMP is the Navy's term for a Hazardous Materials Pharmacy which will be discussed further in section 5.4.

Ozone-depleting Substances (ODS) Reduction

Because the Navy shares the worldwide concern over stratospheric ozone depletion, it has taken steps to phase out the use of ODS. The DoN uses ODS in three primary applications: refrigerants, firefighting agents and solvents. The Navy has adopted an extensive program to identify ODS alternatives and eliminate existing uses.

Acquisition

The DOD (Hazardous Material) HM Pollution Prevention Program requires that HM be selected, used, and managed over its life cycle so that DOD incurs the lowest cost required to protect human health and the environment. It establishes the preferred method of doing this as avoiding or reducing the use of HM. Whereas use of HM may not be reasonably avoided, DOD requires users to follow regulations regarding its use and the employment of management practices which avoid harm to human health and the environment. This requires emphasis to be placed on using less HM in processes and products, as distinguished from end-of-pipe management of HW.

To implement this policy, the Navy will:

- Modify functional area efforts, procedures, guidance documents, or common practices to improve the way the pollution prevention is managed.
- Revise documents, processes, or procedures to facilitate the use of substitutes, where possible.
- Evaluate pollution prevention decisions by economic analysis techniques that match the magnitude of the decision being made, considering cost factors and intangible factors, as applicable.
- Begin economic analyses of pollution prevention decisions at the earliest possible stage of the life-cycle and modify analyses when better information becomes available.
- Record, retain, and provide to appropriate authorities, as necessary, information that describes actions taken on pollution prevention issues and the effect of the actions on the conduct of operations.

P2 Equipment Procurement Program

Under the Navy's P2 Equipment Procurement Program, proven commercial off-the-shelf P2 equipment is being procured that significantly reduces HM use and HW disposal. This ensures standardization and enables DoN to obtain lower unit costs because of bulk purchasing of equipment. Through this initiative, DoN provides shore activities with set-up, training, and logistics support for newly purchased equipment.

Alternative Energies

Finding and utilizing environmentally friendlier energy and fuel sources has been a DoN focus for many years. By using alternative fuel vehicles, geothermal energy, and solar energy, the Navy is promoting use of more natural, less polluting, and cheaper power.

Plastics Reduction

The Navy is focusing on identifying shipboard processes and materials that prevent pollution caused by plastics offload and disposal. Maritime Pollution protocol prohibits the disposal of any plastics into the sea. Since Navy ships generate plastic waste at a rate of approximately one pound per sailor per week improving use of plastics and increasing use of alternatives to plastics can significantly decrease plastic waste generation.

Training

One of the most effective pollution prevention techniques is to ensure that Navy personnel are properly trained on those job functions which have an environmental impact.

Installation Program Elements:

Navy installations shall reduce the amount of HM used and hazardous wastes (HW) generated by up-front HM control in procurement, supply, and use. This shall be accomplished by:

- Developing local mechanisms at shore facilities to identify materials in use that are hazardous and limiting quantities of HM that are procured and stored. Facilities shall establish HM Authorized use lists (AULs) to control the quantity of HM procured and stored.
- Establishing methods for substituting less HM or non-HM where possible.
- Developing and incorporating new technology or materials which have a reduced impact upon the environment, are safer and healthier, or result in reduced emissions.
- Modifying HM shelf-life to reduce the generation of waste as a result of shelf-life expiration, when possible.
- Modifying units of issue to reduce the generation of waste as a result of unused surplus material.

Pollution Prevention Plans

Every facility that is not scheduled for operational closure by 31 December 1997 should have developed and implemented a Pollution Prevention Plan. This plan addresses the actions required by the facility for reducing pollution from all sources and to all media, and should have been developed by the end of 1995. Facility Pollution Prevention Plans incorporate the following elements: purpose, policy statement, applicability and scope, description of shore facility, plan management and administrative elements, planned process-specific improvements, priorities, potential barriers, other requirements, and Commanding Officer's certification. The Pollution Prevention Plan must contain the results of a

comprehensive survey of all processes that use hazardous materials and generate pollutants. The plan must also specify measures to be taken to prevent pollution, milestones for achieving objectives, and those responsible for milestone completion.

Every Navy facility should already have developed a HMC&M plan, a hazardous waste minimization (HAZMIN) plan, and a storm water pollution plan. These plans and any others (i.e. a solid waste management plan and an ozone depleting substances phase-out plan) that a facility may have developed, or be in the process of developing, shall be either referred to or incorporated into the Pollution Prevention Plan.

Pollution Prevention programs are rapidly becoming the key environmental program at Navy installations because of increased costs associated with hazardous waste management. This hazardous waste management requires submission of reports, disposal of wastes, and potential future remediation.

HM Inventory

A current inventory of HM, hazardous chemicals, or chemical substances known or suspected to contain HM should be developed and maintained to control and manage material and should be maintained in a central reference location. Each HM on the inventory should be identified by storage and use location(s) and should be assigned a unique identifier that relates it to a specific Material Safety Data Sheet (MSDS).

Local HM Acquisition Controls

Local procurement controls and audits should be established that are sufficiently stringent to ensure that only HM on the facility AUL is procured and that manufacturers are complying with labeling and warning requirements and are supplying MSDSs with their material. Where practical, as a part of the Navy CHRIMP Program, a hazardous material pharmacy can be created which should help to improve HM control and minimize HM procurement.

Shore Facility Oversight of P2 Activities

The commanding officer should designate a person(s) or organizational entity to develop a written annual review of the shore facility's P2 Program to assess its attainment of objectives, the effectiveness of its P2 Plan, and to recommend

changes and improvements to the plan. The review should be provided to the P2 Committee for discussion and development of appropriate responses, including changes to the P2 Plan.

Recycling Programs

Recycling programs are strongly encouraged at Navy installations. Successes of recycling programs are quantifiable in reduced waste streams and in money saved from less procurement and disposal. Important elements of a recycling program that are reviewed to determine the success of the program include: size of the recycling program, activities or communities impacted, reductions in waste streams achieved, purchases of recycled content goods and materials, and types of recycling projects. Navy installations have initiated programs to stimulate markets for environmentally preferable products and services. By purchasing products composed of recycled materials, the Navy helps to "close the loop" on conserving our natural resources and preventing pollution through the continued promotion and support of resource recovery and recycling programs.

Education and Outreach

Programs to enhance pollution prevention or recycling awareness at any level or any functional area are important elements of a good pollution prevention program. Training programs increase the environmental knowledge of the workers and community involvement activities heighten the visibility of the installation's P2 Program. The high level of installation-to-community interaction is a measure of the Navy's commitment to community outreach programs.

Program Accomplishments:

The numerous P2 success stories throughout the Navy demonstrate the success of its P2 Program. Through the Navy's P2 initiatives, it has cut hazardous waste disposal by 55 percent between 1987 and 1993. Other examples of the Navy's P2 Program accomplishments include (Enviro\$en\$e 1996):

- The Consolidated Hazardous Material Re-utilization and Inventory Management Program prototype operations resulted in savings of \$3.6 million in one year.
- Changes in industrial processes resulted in significant waste stream reductions.
- Eliminated Ozone-Depleting Substances (ODS). Established a CFC/Halon Program Clearinghouse data base for tracking military specifications and standards that require the use of ODS.

- Changed the packaging specifications on ship supplies and avoided 500,000 pounds of plastics being brought aboard each year. Using paper cups on board ships--instead of polystyrene--eliminated another 62,000 pounds of plastic per year.
- NADEP Jacksonville installed 10 aqueous parts washers to replace 13 vapor degreasers and saves approximately \$453,000 per year through cost avoidance.
- Recycling programs have reduced the solid waste stream, disposal costs, and benefited military and civilian employees.
- The Tidewater Interagency Pollution Prevention Program (TIPPP) provided a model for incorporating pollution prevention concepts into a military community. Participants developed and implemented alternatives to reduce the wastes, emissions and adverse environmental impacts of their facilities.
- Use of reusable shop rags saved the USS Theodore Roosevelt over \$51,000 in a six-month cruise by saving on the cost of purchasing rags, decreasing manpower requirements, and reducing HW generation.
- Continued to introduce alternative fuel vehicles for Navy and Marine Corps use. In March 1995, the DoN operated 700 vehicles that run on clean-burning natural gas, with another 1,100 vehicles planned for conversion in 1995.
- Electrolytical Processes have been used to remove metals and cyanide from electroplating solutions containing cadmium, silver and copper cyanide. Ten recovery units will produce 500 pounds of metals in the first five years, with estimated cost avoidance of approximately \$400,000.
- Use of the Explosive Proof Vacuum in spill-clean up operations is an innovative process improvement implemented by Navy activities that increases the efficiency and effectiveness of spill-clean up. These vacuums reduce health hazards posed by hazardous material spills, and reduce the quantity of hazardous waste generated and cost of HW disposal.
- Through the use of 55 gallon drum crushers, the Navy has reduced the storage requirements and disposal costs associated with hazardous material and hazardous waste. Due to the lack of space aboard ship, this reduction in storage requirements significantly increases the productivity of a ship's force. Cost avoidance on board a typical aircraft carrier would be \$8,200 annually before the initial cost of the drum crusher (\$8,000).
- Marine Corps Air Station Cherry Point, North Carolina recovered and recycled more than 4.6 million pounds of materials, producing more than \$330,000 in income for the Air Station.
- Zero-discharge rinse-water systems were used by Navy shipyards to recycle water for chrome plating baths to recycle water. The shipyards recycled nearly 3,200 tons, achieving cost avoidance of approximately \$3 million.
- The first chlorofluorocarbon-free (CFC-Free) ship to operate without the use of CFCs in its air conditioning and refrigeration plants was USS DEWERT in 1993. Currently seven ships are CFC-Free and over 70 chilled water AC plants and ship stores refrigeration plants have been converted to HFC-134a.
- Navy Environmental Leadership Program (NELP) activities were selected to serve as model installations in the pollution prevention area. Through the application of the P2 planning process and the equipment procurement program at these locations, the Navy developed new and better ways to conduct day-to-day management of activity environmental programs.

In addition to a measurable return on investment, there were other "less obvious" benefits of investment in pollution prevention. These included a reduction in critical risk, a significant reduction in the volume of hazardous material procured and produced, productivity increases, and improvements in overall occupational health and safety.

5.3 The Air Force P2 Program Description

Background:

The Air Force takes a strong leadership role in preventing pollution by reducing the use of hazardous materials and the release of pollutants into the environment. Preventing pollution requires a proactive and dynamic management approach because prevention achieves environmental standards through source reduction rather than "end-of-pipe" treatment (AFR 32-7080 1994).

The Air Force outlined three initiatives in its March 13, 1995 Memorandum, "Environment, Safety and Occupational Health Initiatives." These initiatives are to sustain readiness, be good neighbors, and leverage limited resources. Pollution prevention is the key to realizing these initiatives.

Great progress has been made in the Air Force's Pollution Prevention Program to include significant reductions in hazardous waste and solid waste disposal, and instilling a pollution prevention ethic Air Force-wide. The Air Force is committed to support the national defense mission while creating a cleaner, healthier environment.

Air Force References:

- Air Force Instruction (AFI) 32-7080, Pollution Prevention Policy, May 12, 1994
- Secretary of the Air Force, Instruction for the Pollution Prevention Program, AFI 32-7160, June 15, 1993
- U.S. Air Force Installation Pollution Prevention Program Guide (HQ AFCEE/EP), August 1995
- Secretary of the Air Force, Air Force Pollution Prevention Strategy, July 24, 1995
- Secretary of the Air Force, Air Force Pollution Prevention Program, January 7, 1993
- Pollution Prevention on Air Force Acquisition Programs, SAF/AQ, August 23, 1994
- Guidance to Bioenvironmental Engineering Services for Implementing the Air Force Pollution Prevention Program (HQ USAF/SG), May 19, 1992
- Draft Air Force Energy Program Procedural Memorandum 95-XX, Air Force Water Management Program, July 1995

Mission:

To organize, train, and equip active duty and reserve forces for the preservation of peace, national security and defense. The Air Force's mission focuses on air operations.

Environmental Strategy:

The U.S. Air Force (USAF) pollution prevention vision statement is as follows:

“Effectively promote pollution prevention by minimizing or eliminating the use of hazardous materials and the release of pollution into the environment. Meet or exceed regulatory requirements through the use of education, training and awareness programs, health-based risk assessments, acquisition practices, contract management, facilities management, energy conservation, and innovative pollution prevention technologies.”

The Air Force Pollution Prevention Policy sets forth guidelines for the execution of a Pollution Prevention Program. The Program reduces hazardous and toxic materials and wastes by means of source reduction and recycling at Air Force Installations. The P2 Program involves efforts to improve personnel awareness regarding installation operations that pollute to help improve environmental compliance.

The USAF pollution prevention strategy was recently revised to reflect changes in environmental laws, executive orders, and new Department of Defense policies and goals. According to a 24 July 1995 Secretary of the Air Force letter, “Air Force Pollution Prevention Strategy,” the objectives of the revised policy include the following:

- Permeate all mission areas with the pollution prevention ethic through comprehensive education, training, and awareness;
- Institutionalize pollution prevention into all phases of the weapon system life-cycle;
- Incorporate pollution prevention in all aspects of installation operations; and
- Develop and transition innovative pollution prevention technologies to the field.

This strategy includes numerous sub-objectives and replaces the Air Force Pollution Prevention Plan originally published in January 1993.

Air Force Pollution Prevention Policy and Goals:

Department of the Air Force Instruction 32-7080, Pollution Prevention Program implements Environmental Quality. It gives the directive requirements for the USAF Pollution Prevention Program. The guidance and procedures outlined in the instruction typically apply to all Air Force installations within the United States, its

territories, and in foreign countries. Additionally, it applies to the Air Force Reserves, the Air National Guard, government owned-contractor operated facilities, and direct reporting units and field operating agencies not located on Air Force installations.

The instruction is intended to provide major commands (MAJCOM) and installations with a framework on how the Air Force does business to comply with pollution prevention requirements. It provides minimum requirements for standardization across the Air Force, thus providing flexibility to MAJCOMs and installations on how to comply with pollution prevention standards.

The Air Force has established quantitative goals for waste reduction and affirmative procurement. These goals include:

- By October 1, 1995, a hazardous material tracking system was to be implemented at all USAF installations.
- By October 1, 1995, recycling and composting was to be performed (where possible) at all USAF installations.
- By the end of 1996, reduce purchases of EPA 17 Industrial Toxics by 50% from the 1992 baseline. In addition, reduce hazardous waste (HW) disposal by 25% and municipal solid waste (MSW) disposal by 30% from the 1992 baseline.
- By the end of 1997, reduce MSW disposal by 50% from the 1992 baseline.
- By the end of 1999, reduce HW disposal by 50% from the 1992 baseline. Also, reduce volatile air emissions by 50% from the 1993 baseline.
- By the end of 2000, reduce the amount of pesticide/herbicide applied annually, as measured in pounds of active ingredient, by 50 percent from the 1993 baseline.
- By 2005, identify and accomplish all energy and water conservation actions with pay back in ten years or less. Achieve a reduction in facilities energy consumption, as measured in BTUs/SF, by 30 percent from the 1985 baseline.

Some of the qualitative goals of the USAF P2 Program follow:

- Reduce hazardous materials in new weapons and existing weapons systems, at installations and GOCOs. Ensure P2 Plans are developed at installations and GOCOs.
- Foster cooperative intergovernmental and government-industry partnerships/alliances to solve issues of environmental significance.
- Apply state of the art pollution prevention technologies throughout the Air Force.
- Establish an investment strategy in the Air Force to fund the Pollution Prevention Program.

A key goal of the Air Force's Pollution Prevention Program is to instill pollution prevention as a way of life. Specific goals for meeting the Air Force's four primary pollution prevention objectives have been developed for each of the Air Force's program elements: EPA 17 industrial toxics, ozone-depleting chemicals, hazardous wastes,

municipal solid waste, affirmative procurement of environmentally friendly products, energy conservation, and air and water pollution reduction. An example of the USAF energy conservation goals is provided below:

- Implement a comprehensive program to accomplish cost effective conservation in all existing installations and energy systems;
- Develop and apply incentive programs such as gain sharing, shared energy performance contracting and utility demand side management program;
- Design and construct new facilities to minimize the life-cycle cost of the facility by utilizing energy and efficiency techniques and renewable energy technologies; and
- Operate, maintain and upgrade existing facilities to conserve water when cost-effective to do so.

Air Force-wide Program Elements:

In January 1993, the Secretary of the Air Force and the Chief of Staff of the Air Force issued a pollution prevention action plan that has served as a model for the Department's pollution prevention strategy. The Air Force established a separate program element to support pollution prevention in the budget process. This strategy was updated in the, "Air Force Pollution Prevention Strategy," of July 24, 1995. Several of the key Air Force-wide program elements are included below.

Affirmative Procurement Program

As a minimum, Air Force Major Commands are required to establish procurement programs for all EPA Guideline Items, and in accordance with RCRA, subtitle F (Section 6002), and EO 12873. Each activity will review and revise specifications for the designated items to allow procurement of products containing recovered materials. While each procurement agency may design its own program, so long as it meets the requirements of RCRA, all affirmative procurement programs must have the following four elements: a preference program; a promotion plan; procedures for obtaining and verifying estimates and certifications of the content of recovered materials; and annual review and monitoring.

Regional Pollution Prevention Efforts

Air Force policy encourages participation in partnerships and regional pollution prevention efforts. One program in which the Air Force has provided leadership is the Tidewater Interagency Pollution Prevention Program (TIPPP). The TIPPP is a cooperative effort between the USEPA, DOD (Army, Air Force, and Navy), DOE, NASA, and the Virginia Department of Environmental Quality to integrate pollution prevention into daily activities of Federal Installations in Virginia's Tidewater area (Original participants were EPA, DOD, and NASA). The TIPPP is a component of EPA's Model Community Pollution Prevention Program (MCPPP), and originated as part of the EPA/DOD Chesapeake Bay Agreement. It is a program designed to demonstrate pollution prevention best practice methods and to share and disseminate pollution prevention information. Since the inception of TIPPP on 6 August 1991, the Air Force has served as the lead agency.

Management & Equipment Evaluation Program (MEEP)

The MEEP program evaluates a variety of engineering and transportation equipment for its potential for use by the Air Force. It has evaluated a variety of technologies which can contribute to pollution prevention programs. These include evaluation of extended life, safer lead acid batteries; solvent, engine coolant, paint thinner, engine oil and filter recycling systems; and dustless sanders. Drum crushers and oil/fuel filter crushers have been evaluated as well. The MEEP program has also analyzed systems for the recovery of aircraft deicing fluid, and systems for the use of waste oil as fuel.

The MEEP program can be a source of information on commercial pollution prevention products which have military applications. By evaluating the equipment before procurement, Air Force organizations can procure parts or equipment which have a proven pollution prevention capability. The MEEP program accepts and evaluates equipment from private industry, on a no cost basis. It provides manufacturers evaluations of the equipment and its utility for the Air Force, and publishes reports on its activities. The MEEP program works informally with other Military Departments and Federal Agencies; and coordinates its activities with the Air Force Center for Environmental Excellence (AFCEE).

Energy Conservation

Energy conservation and pollution prevention are complementary Air Force Programs. The essential connection between energy conservation and pollution prevention is that burning fossil fuels produces harmful greenhouse gases and photochemical smog. It is important to develop and maintain a spirit of commitment to energy conservation as an integral part of the USAF's P2 Program.

All functions at Air Force installations, including industrial, administrative and residential, will: conduct opportunity assessments to search for more energy efficient ways to accomplish tasks; apply new and existing technologies to facility design, renovation, and maintenance projects; and continue to educate all personnel on the direct impact energy conservation has on creating a cleaner environment.

Installation Program Elements:

As stated, Air Force Instruction 32-7080 provides the directive requirements for the Air Force Pollution Prevention Program. Headquarters, Air Force establishes overall Air Force policy for pollution prevention, integrates Air Force programs with DOD policy, and provides support to Air Force organizations to assist them in the implementation of their programs. The following is a brief description of the installation level programs:

Environmental Protection Agency 17 Industrial Toxics Program

The Air Force implements the EPA's 17 Industrial Toxics program as part of its Pollution Prevention Program. It requires a Hazardous Material Purchases Report (HMPR) to be released quarterly to help higher headquarters measure an installation's performance against DOD and Air Force goals. Each installation must forward HMPR input to Headquarters, Air Force. The EPA's target chemicals include: Benzene, Cadmium and compounds, Carbon Tetrachloride, Chloroform, Chromium and compounds, Cyanides, Dichloromethane, Lead and compounds, Mercury and compounds, Methyl Ethyl Ketone, Methyl Isobutyl Ketone, Nickel and compounds, Tetrachloroethylene, Toluene, Trichloroethane, Trichloroethylene, and Xylene(s).

Hazardous Waste Minimization Program

The Air Force requires all Major Commands to minimize hazardous wastes from industrial, maintenance, and cleanup operations to the most economically practical extent. Installations will strive to reduce hazardous waste generation at the source.

Hazardous Material Pharmacy

A concept designed to improve control of hazardous materials on Air Force installations. To reduce the use of and gain better control of hazardous materials, the pharmacy follows a three-stage approach: requisition and authorization; distribution, dispensation, and collection; tracking and accounting. The most important benefits from the use of the HAZMAT pharmacy concept is pollution prevention, and regulatory compliance with RCRA, CERCLA, and Executive Order 12856. The next section of this report will discuss the military's Hazardous Materials Pharmacy Program in more detail.

Qualified Recycling Program (QRP)

The Air Force requires each of its installations (worldwide) to have a Qualified Recycling Program. The goal of the program is solid waste reduction, pollution prevention, and conservation of natural resources. The QRP acts as an umbrella organization consisting of up to four separate recycling parts: an appropriated funded activity; a Services (non-appropriated funds) operation; an Army Air Force Exchange Service (AAFES) section, and a Defense Commissary Agency (DeCA) portion. The program focuses on three major areas: recycling, composting, and affirmative procurement reporting.

Ozone-Depleting Chemical (ODC) Program

The Air Force goal is to help protect the earth's stratospheric ozone layer by eliminating dependence on chlorofluorocarbons, halons, and other ozone depleting substances in facilities and weapon systems. Major Commands are required to: prohibit the purchase of all Class I ODCs (unless approved by a waiver); prohibit the purchase of halon fire extinguishing equipment, and ODC air conditioning and refrigeration equipment for ground applications; modify operating, training, and testing practices; implement conservation measures, such as recovery,

recycling, and reuse measures to reduce atmospheric discharges; identify and give priority to ODC uses based on mission impact and act to quickly convert mission-critical systems to non-ODCs; identify existing ODCs that could be reallocated; and manage ODCs to meet mission needs, including mobilization and emergency requirements, during conversion of systems to non-ODCs substitutes.

Program Accomplishments:

The Air Force received both the 1993 Secretary of Defense Team Pollution Prevention Award and the 1993 Secretary of Defense Installation Pollution Prevention Award (Tinker Air Force Base (AFB)). Specific accomplishments of the USAF P2 Program include (Enviro\$en\$e 1996):

- Tinker AFB implemented process changes and materials substitution to reduce by 25% their use of EPA toxic chemicals.
- The F-22 program eliminated all but one use of Class I Ozone Depleting Chemicals (ODCs) from production, operation and maintenance procedures. The Air Force received three 1993 EPA Stratospheric Ozone Protection Awards in recognition of exceptional leadership, personal dedication, and technical achievements in eliminating ozone depleting substances. Hill AFB reduced 1992 ODC emissions by over 60% against a 1991 baseline.
- An Air Force leader in the effort to reduce emissions of volatile organic compounds (VOCs) is Seymour Johnson AFB. The installation of a retrofit VOC abatement system in the aircraft corrosion control facility has reduced VOC emissions 98% from previous levels. Similar technology implemented in the support equipment corrosion control facility has reduced VOC emissions 81 to 92% from previous levels.
- The Air Force's current pollution prevention efforts, as tracked through hazardous and solid waste disposal metrics, are ahead of schedule. Against a CY92 baseline and reduction goals of 25% by CY96 and 50% by CY99, hazardous waste disposal has decreased 18.8% through CY93. Against a CY92 baseline and reduction goals of 25% by CY96 and 50% by CY97, solid waste disposal has decreased 20.4% through CY93.
- The Air Force Material Command has an aggressive program to screen 158,000 technical orders for possible elimination of language requiring the use of ODCs and EPA 17 toxic chemicals.
- Air Force leadership in the areas of recycling and composting is exemplified by Whitman and Seymour Johnson AFBs and the Air Force Academy. Whitman AFB's resource recovery and recycling programs (RRRP) have reduced the base's solid waste stream by 50% and earned over \$108,000. Seymour Johnson AFB was the first Air Force installation to begin a full scale yard waste composting program. Material currently being composted at the Air Force Academy includes a mixture of approximately 10% pine needles, 15% grass, 25% sod, and 50% stable bedding.
- The Air Force established seven product area committees (e.g., airframe, engine, avionics) to partner with industry, sister Services, and other weapon system program managers to solve common environmental problems. The Air Force adopted the Hazardous Material Pharmacy concept to control hazardous material from "cradle to grave." This program will be discussed in section 5.4.
- The Air Force is developing an environmental research and development acquisition plan that focuses on such technology needs as: testing chromate-free primers for aircraft; developing less hazardous replacements for ethylene glycol aircraft deicers; and a maintenance-free nickel cadmium battery.
- Air Force partnering efforts include McClellan AFB's involvement as an Environmental Process Improvement Center (EPIC) and Langley AFB's membership in the Tidewater Interagency Pollution Prevention Program (TIPPP). In 1991, McClellan AFB, California EPA, and USA EPA Region 9

voluntarily established McClellan as an EPIC to enhance regional alliances and promote effective environmental compliance and pollution prevention. The Air Force is the lead agency for EPA-sponsored TIPPP, which was established in 1991 to incorporate and implement pollution prevention policy in the daily programs and activities at Chesapeake Bay area installations of the Army, Navy, Air Force, and NASA.

5.4 Hazardous Materials Pharmacy Program

The Hazardous Material (HAZMAT) Pharmacy concept, adopted by both the Navy and Air Force, embodies a cultural change in the management of hazardous materials at the base level and establishes single point control and accountability over the requisitioning, receipt, distribution, issue and reissue of hazardous materials. Much of the material contained in this section was obtained from a HAZMAT Pharmacy summary produced by PRO-ACT.

Navy and Air Force bases have historically had difficulty in achieving control over the acquisition and disposal of hazardous materials. Contributing to this problem is the presence of multiple independent procurement vehicles through which base organizations can acquire hazardous materials. As many as six to ten such vehicles are sometimes present. Base organizations may place the same requisition with two or more of these vehicles, or several organizations may order the same material through different channels. There are often limited controls over the placement of requisitions, and no means to consolidate records of hazardous material acquisition across all procurement vehicles. Quantities of hazardous materials entering bases are difficult to determine, and accountability for the issue and use or disposal of these materials cannot be established. These problems, coupled with the need to comply with increasingly stringent Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) regulations, demand that the Navy and Air Force change the way they manage hazardous materials. The HAZMAT Pharmacy is designed to help make that change.

The Hazardous Material Pharmacy concept is designed to improve control of hazardous materials on Navy and Air Force installations. Significant progress has been made in the field of hazardous material management by various military and civilian organizations. These organizations have demonstrated the ability to achieve reductions

in hazardous material usage, procurement and hazardous waste generation through combinations of management controls, organizational changes and automated information system support.

To reduce the use of and gain better control of hazardous materials, the pharmacy follows a three-stage approach. The three stages, requisition and authorization, distribution, dispensation and collection, and tracking and accounting, provide increased cradle-to-grave control of hazardous materials (AFCEE 1994).

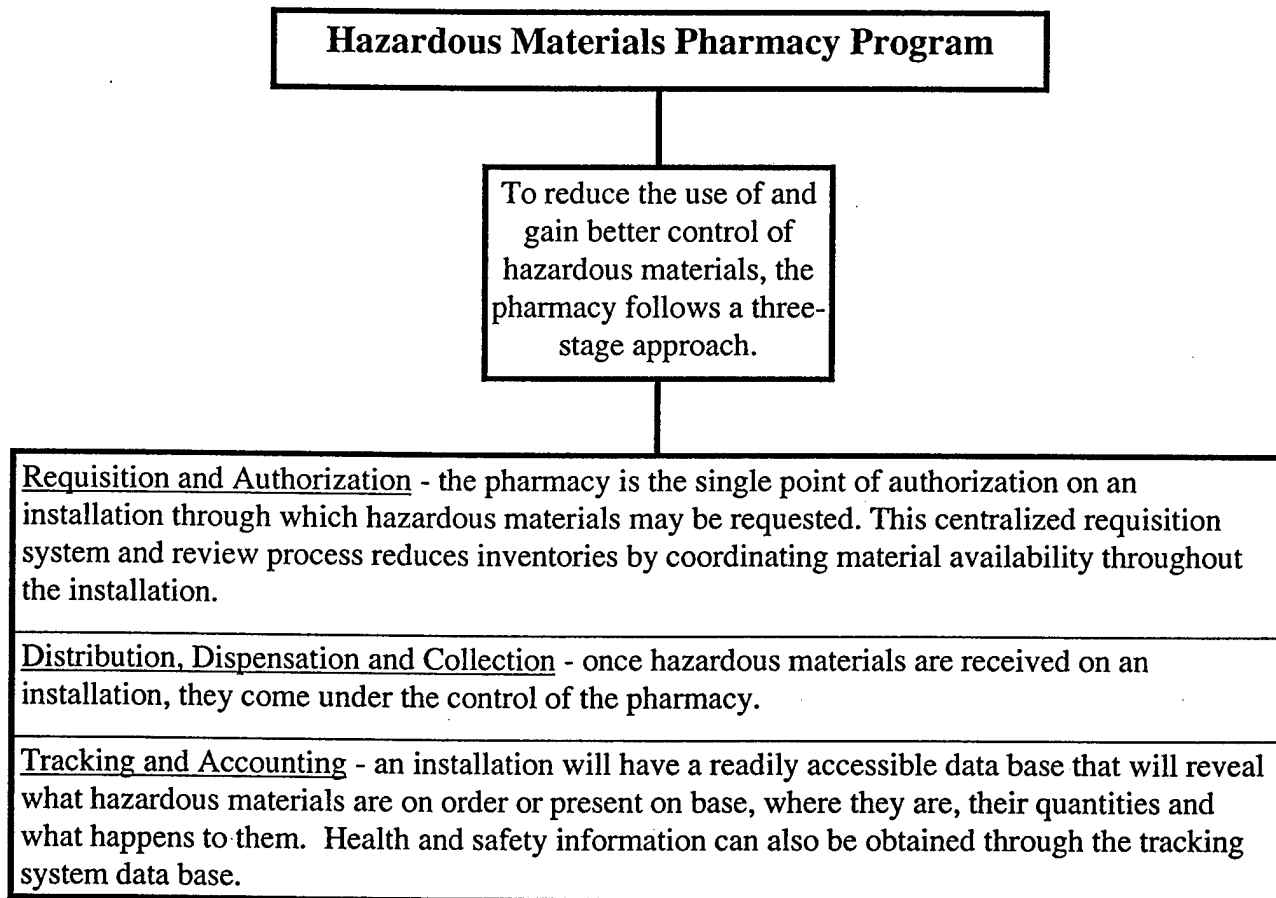


Figure 5.1: Hazardous Materials Pharmacy Program Elements

Requisition and Authorization

The pharmacy is the single point of authorization on an installation through which hazardous materials may be requested. Users who require hazardous materials submit their request to the pharmacy, where it is reviewed by a team of experts from supply/contracting, civil engineering (environmental, disaster preparedness, fire safety), and other offices (legal, public affairs) as needed. The review assures: the requester is authorized to use the material; the most environmentally benign product will be obtained; and the quantity purchased will be the minimum necessary to fulfill the user's needs. This centralized requisition system and review process reduces inventories by coordinating material availability throughout the installation. Following the review, if acquisition of the requested materials is authorized, the requisition is entered into a tracking system that will follow the material from acquisition through its eventual use or disposal.

Distribution, Dispensation and Collection

Once hazardous materials are received on an installation, they come under the control of the pharmacy. Pharmacies may either operate from a separate facility at which hazardous materials are stored and issued, or they may issue directly from base supply. However organized, the pharmacy controls the actual issue of the materials ensuring quantities issued are justified by customer needs. The pharmacy also collects unused quantities and makes them available to other users or for recycling or reclamation. Central control offers Navy and Air Force bases several advantages. Waste is reduced by closely tailoring the quantities issued to the needs of each user. The pharmacy can keep track of total inventories and reduce shelf-life expiration problems. This will save supply dollars and reduce the risks and costs of hazardous materials management outside the pharmacy. The pharmacy can match the materials available to all requesters on an installation and more easily identify recycling opportunities. In this way the pharmacy can limit the disposal of hazardous materials as hazardous waste.

By tailoring the quantities issued to the needs of each user, the pharmacy can reduce problems associated with distributing and dispensing hazardous materials. For example, the pharmacy can distribute materials in their original containers and in sizes suitable to the user's needs. This avoids problems associated with the acquisition of larger

size containers (from which smaller quantities are dispensed). This approach is also more economical and eliminates health, safety and management problems associated with the dispensing and storage of excess hazardous materials.

Tracking and Accounting

Good management and regulatory requirements require Navy and Air Force bases to closely account for all hazardous materials on their installations. One of the principal benefits of the HAZMAT Pharmacy is its capability to provide such accounting. Navy and Air Force bases have multiple data processing systems for ordering and accounting for supplies, including hazardous materials. These vary in the type and comparability of data they maintain, making it difficult to assemble a single, accurate list of hazardous materials present on an installation at any one time. Increasingly stringent environmental and health and safety regulations make this an unacceptable situation.

The pharmacy tracking system begins when a hazardous material is first ordered and continues through receipt, issue, use, and for unused quantities, collection or return, reissue, recycling and, if necessary, disposal. In this way, an installation will have a readily accessible data base that will reveal what hazardous materials are on order or present on base, where they are, their quantities and what happens to them. Health and safety information can also be obtained through the tracking system data base.

The availability of data from the pharmacy tracking system enhances the Navy and Air Force's ability to comply with the law and eliminates the need for costly, laborious and frequently inaccurate hand assembly of hazardous material information. The Navy and Air Force are better able to communicate needed health and safety information to their personnel and can better control the eventual disposition of hazardous materials, assuring beneficial uses are found for the maximum amount of unused materials and where disposal as hazardous waste is unavoidable, such disposal will be done properly.

Navy and Air Force Commands are in various stages of establishing HAZMAT Pharmacies at their installations, and have reported a variety of experiences. Some observations to date include:

- For a HAZMAT pharmacy to succeed, it must have the full support of the Commanding Officer/Base Commander. Introducing a new way of doing business, especially one as innovative as this, will meet with resistance.
- The Commanding Officer/Base Commander must be prepared to commit the facilities, funds, personnel and equipment required.
- The Commanding Officer/Base Commander must provide the leadership which expresses to all personnel the importance of this concept in enabling the Navy and Air Force to meet their missions in the face of shrinking resources and increasingly more stringent regulatory requirements.
- Even with full command support, the HAZMAT Pharmacy will not work if the right people are not involved. The pharmacy will require active and involved support from numerous base organizations. The pharmacy must be actively marketed and advertised. Organizations must be informed of the reasons why the pharmacy is required and, more importantly, the benefits which can arise from its use. This will greatly reduce the reluctance to participate and will ease the transition to a totally new way of doing business.
- The pharmacy should be implemented on an incremental basis. The entire base should not be included at once. The organizational structure and the operating procedures must be in place prior to beginning. These should then be refined using one or two organizations. Once the initial units are integrated into the system and the operating procedures have been tested, additional units can be brought on-line.
- To assure efficient operation, HAZMAT pharmacies must be properly equipped, their staffs properly trained and adequate facilities provided to permit efficient operation. Pharmacies require a forklift and usually two delivery vehicles (pick-ups, 1 1/2 ton trucks, or metro stepvans). They will also require computers to track the hazardous chemicals.
- The pharmacy must be staffed by a multi-disciplinary team, utilizing personnel from a variety of organizations and career fields. These people must have in-depth knowledge of the disciplines involved in supply procurement and distribution as well as handling hazardous wastes. They must receive training including hazardous waste management, hazardous waste operation and Department of Transportation hazardous material transportation requirements.
- The pharmacy must be housed in a facility adequate to meet its needs. It can be either newly constructed or a modified existing building. The facility must be designed to handle, dispense and store hazardous materials and often hazardous waste.

The benefits of creating and managing a hazardous material pharmacy are significant. The most important benefit from the use of the HAZMAT pharmacy concept is regulatory compliance. Of course, another benefit is cost savings. Model HAZMAT Pharmacy operations at Point Mugu Naval Air Weapons Station reduced hazardous material purchases from \$132,000 to \$43,000. Similarly, Hill Air Force Base, Utah, reduced HM acquisition costs from \$14 million in 1990 to \$4 million in 1992 (Freeman, 1995).

5.5 Conclusion

Chapter Five discussed the execution of pollution prevention programs by the three Services. The focus of the chapter was to study the broad management of each Service's P2 Program, as well as, review the installation level program elements. Numerous similarities exist among the three programs since each program must comply with DOD direction and many of the concepts and ideas of program implementation and oversight are shared. A summary matrix (Table 5.1) has been provided on the next page to indicate the program elements of each Service's P2 Program. The next chapter will discuss three important pollution prevention support organizations that help manage the Army, Navy, and Air Force Programs.

Table 5.1: Matrix of P2 Program Elements			
	ARMY	NAVY	AIR FORCE
Create a model installations program		✓	
Improve acquisition management	✓	✓	✓
Use life-cycle cost analysis	✓	✓	✓
Establish a P2 investment strategy	✓	✓	✓
Establish recycling programs at all installations	✓	✓	✓
Replace ODS/ODC	✓	✓	✓
Utilize new P2 technology	✓	✓	✓
Incorporate P2 into research and development functions	✓	✓	✓
Revise technical specifications	✓	✓	✓
Minimize all hazardous and non-hazardous wastes	✓	✓	✓
Standardize HAZMAT tracking and control methods	✓	✓	✓
Implement a HAZMAT Pharmacy approach		✓	✓
Develop installation P2 plans	✓	✓	✓
Reduce energy use	✓	✓	✓
Provide training and create a P2 ethic	✓	✓	✓
Perform comprehensive P2 public affairs planning	✓	✓	✓

CHAPTER 6: P2 Support Organizations

This chapter will provide a comprehensive analysis of the pollution prevention functions of three important support organizations within the different Military Departments. These organizations, the Army Environmental Center (AEC), Navy Facilities Engineering Service Center (NFESC), and Air Force Center for Environmental Excellence (AFCEE), will be reviewed using the following 15 categories of products and services. Using similar categories will enable a comparison of the products and services to be made. The author does not intend to imply that the products and services discussed are the only ones that each organization offers concerning pollution prevention. An effort was made to include only the most important products and services concerning pollution prevention.

Categories of Products and Services

- Research and development of new technology
- P2 equipment procurement program
- P2 acquisition management
- Development and/or review of pollution prevention plans, solid waste management plans, etc.
- Environmental report development and analysis
- Environmental information systems support
- Inspections/assessments
- Industrial hygiene support
- Ambient air monitoring services
- Internet or modem sites
- Documents produced
- Management of hotlines
- Newsletters produced
- Conferences
- Training

This chapter will also introduce the reader to three newly formed joint pollution prevention committees the Joint Group on Acquisition Pollution Prevention (JGAPP), Joint Pollution Prevention Advisory Board (JPPAB), and the Tri-Service Environmental Support Centers Coordinating Committee. Formation of these organizations is a sign of the continuing efforts of the three Services to work together more closely in their efforts to prevent pollution.

6.1 The Army Environmental Center (AEC)

On February 5, 1993, the U.S. Army Toxic and Hazardous Materials Agency was redesignated as the U.S. Army Environmental Center, under the direction and guidance of the Director of Environmental Programs, a newly created Department of the Army staff position (AEC 1996).

The U.S. Army Environmental Center is a major focal point in the program management and support efforts of the Army-wide environmental program. The AEC's mission includes centralized management, oversight, coordination, and execution of Army environmental programs. The Center also provides technical and related support and consultation to Headquarters, Department of the Army; Major Army Commands (MACOMs); U.S. Army Corps of Engineers' Headquarters, Divisions, and Districts; and individual Army installations nationwide and around the world.

Headquartered in the Edgewood Area of Aberdeen Proving Ground, Maryland, the AEC has an authorized staff of more than 200 civilian and military personnel to meet the Army's environmental challenges. Its activities are aggregated into four Army Environmental Center Divisions:

- Environmental Compliance, Conservation, and Pollution Prevention
- Environmental Restoration
- Environmental Research, Technology Development, and Technology Transfer
- Environmental Information Management

The majority of personnel employed at the AEC are military and civilian scientific and engineering professionals with varied and diverse backgrounds, including, among others, biology, chemistry, geology, chemical engineering, environmental engineering, civil engineering, computer engineering, and archeology. These professionals are supported by professionals in resource management, safety, public affairs, and law.

The Army Environmental Center manages a broad range of programs designed to help Army installations prevent pollution to the air, water, and land. These programs help Army soldiers and civilians reduce the risks associated with hazardous materials. In addition, they help installations avoid the rising costs of pollution control and waste disposal.

AEC's goal is to integrate the work done by these specialists to support installations in their efforts to prevent pollution. By helping installations minimize waste and reduce operating costs, AEC hopes to instill the pollution prevention ethic throughout the Army community.

6.2 AEC's Major P2 Products and Services

Research and development of new technology:

The AEC does not perform research and development. The AEC integrates its programs with the Corps of Engineers' comprehensive research laboratory capabilities, which are focused on the development of innovative and cost-effective technologies for detection, monitoring, and restoration of contaminated sites, and new ways to prevent pollution and reduce hazardous waste generation. Included in these efforts are field demonstration and pilot-scale projects to help ensure that research products are developed and used in the field.

The AEC assists in the demonstration and transfer of cost-effective industrial process changes and technologies designed to reduce waste generation. During the past 5 years, AEC has successfully demonstrated and fielded such alternative process as aluminum ion vapor deposition as a substitute for cadmium plating; high-volume, low-pressure paint spraying; filtration systems to extend paint stripping bath life; and water-based parts washers to replace solvent vapor degreasers.

P2 equipment procurement program:

AEC does not procure equipment for Army installations.

P2 acquisition management:

Army P2 acquisition management is performed by AAPP SO. AEC is not responsible for acquisition-related pollution prevention issues.

Development and/or review of pollution prevention plans, solid waste management plans, etc.:

The AEC Environmental Compliance, Conservation, and Pollution Prevention Division provides comprehensive program management and technical support to help installations meet changing regulatory requirements. Examples include Army-wide programs to develop required air pollution and storm water permits. The Center's staff works with logistics and acquisition and helps communities to implement and integrate new pollution prevention programs throughout the Army. Technical specialists assist MACOMs and installations in preparing management plans to preserve and protect cultural and natural resources.

As a requirement of Executive Order 12856, most Army installations must have developed Pollution Prevention Program Plans by the end of 1995. To support facilities in meeting this deadline, AEC developed a Model Pollution Prevention Plan. In addition, the Center provides assistance to help installations organize programs, identify opportunities, and develop site-specific strategies for preventing pollution.

Environmental report development and analysis:

Since 1993, AEC has been helping Army installations meet their pollution prevention and EPCRA requirements. The Center offers technical guidance and assistance in developing inventories, determining thresholds, and preparing reports. By showing where toxic chemicals are used and how wastes are managed, EPCRA reporting helps installations identify targets for pollution prevention.

Environmental information systems support:

To help make the management of hazardous materials easier, AEC is working with logisticians, environmentalists, and computer experts throughout DOD to test and field the Hazardous Substance Management System (HSMS). Once fielded, this system will interact with standard supply systems to track inventories of

hazardous materials from purchase through end use. HSMS will also allow environmental staffs at installations to track wastes and calculate releases to air and water, as well.

Inspections/assessments:

The AEC Pollution Prevention Team provides pollution prevention support to Army commands and installations. Its primary operational areas include:

- Conducting Pollution Prevention Opportunity Assessments
- Developing Pollution Prevention Plans and Annual Updates
- Conducting Alternative Technology/Processes Studies
- Development of Information Pollution Prevention Information Papers
- Providing Technical Consultative Services

In addition to the pollution prevention functions listed above, the Pollution Prevention Team provides technical support to the Army Medical Department's (AMEDD) Environmental Requirements Program (ERP).

Industrial hygiene support and ambient air monitoring services:

These services are not provided by AEC.

Internet or modem sites:

AEC provides WorldWide Web access to all of its products and services (some portions of this site are still under construction).

Documents produced:

To assist installations in planning and executing their pollution prevention programs, AEC has published an Installation Level Pollution Prevention Guide. This manual was prepared to assist Army installations in establishing an installation pollution prevention program plan. This manual applies to all Army installations and activities, including Army units in unified commands, the Army Reserve, the Army National Guard, and Government Owned-Contractor Operated (GOCO) facilities. This manual provides a strategic approach for developing a pollution

prevention plan. The intended audience for this manual is the person (or group) responsible for implementing pollution prevention installation-wide. This person is designated the Pollution Prevention Coordinator.

AEC has also published other documents that assist installation Pollution Prevention Coordinators with managing their P2 Programs. These documents include the Unit Level Hazardous Materials and Hazardous Waste Guide and the P2 Opportunity Assessment Protocol.

Management of hotlines:

Environmental Response Line

The Army Environmental Center (AEC) provides environmental program support to Army installations worldwide. As part of their support efforts, AEC has expanded its response line to provide more rapid responses to inquiries from the field. The response line, described below, can provide information on Army pollution prevention programs and specific pollution prevention actions.

By dialing the Army's Environmental Response Line, an Army activity will have access to the most up-to-date information available on environmental issues ranging from compliance to restoration and from prevention to conservation. Phone numbers for the Army's Environmental Response Line and other pollution prevention assistance services are listed in Appendix 'F.'

Begun in 1989, the environmental response line was recently expanded and upgraded in an effort to make it more responsive to the Army community's need. The "personal touch" is among the program's new features. The voice that now answers the phone is not a recording from an answering machine. Response-line personnel can clarify callers' questions and make immediate referrals to sources with the most accurate, timely answers to questions. Sometimes that source is an AEC subject-matter expert who is skilled in the environmental discipline appropriate to the question. At other times, callers are referred to a specific regulation or policy memorandum. The aim of the response line is to provide the caller with the most accurate, up-to-date environmental information in the least amount of time. Response-line personnel are required to follow up all queries with phone calls to both the questioner and the subject-matter expert, to ensure that the issue has been resolved. If questions from the field can't be answered by the AEC staff, they will query outside resources such as the U.S. Army Environmental Hygiene Agency

(now known as the Center for Health Promotion and Preventive Medicine, or CHPPM) and others that operate information lines and technical-information services.

The U.S. Army Construction Engineering Research Laboratory (800 USA-CERL) is developing a data base to assist the response line staff in tracking queries and analyzing trends. The Environmental Response Line is just one aspect of an Environmental Information Services program designed by the AEC and operated by Horne Engineering Services, Inc., of Alexandria, VA.

Newsletters produced:

A newsletter called the "Quarterly Update" is produced by AEC and distributed to Army installations. This newsletter, as the name implies is produced every three months, and discusses a broad spectrum of Army environmental issues including pollution prevention. The newsletter is geared for reading by both technical and non-technical personnel and focuses on Army success stories, upcoming reports, and current environmental news.

Conferences:

The AEC does not host any major conferences that are specific to pollution prevention. Members of AEC lecture at and participate in the Joint Service Pollution Prevention Conference and Exhibition sponsored by AFCEE.

Training:

AEC provides limited training to field activities. This training primarily involves installation and use of new environmental software at Army bases.

6.3 The Naval Facilities Engineering Service Center (NFESC)

Navy bases (or military installations) are where pollution prevention projects are actually implemented. The other elements of the Navy's environmental organization are either higher level activities to whom the bases are operationally responsible (major claimants, CNO N45, and SECNAV) or the environmental support network for the installations. Since the focus of this paper is pollution prevention, the activity that is responsible for supporting the Navy's P2 Program (at a macro-level), the Naval Facilities Engineering Service Center (NFESC) will be discussed in more detail in this section.

By focusing on the role NFESC plays in the Navy's Pollution Prevention Program, it is not the author's intent to detract from the role the other activities play in successfully executing the P2 Program. Each of the activities in the Navy's environmental organization play an important role in P2 Program implementation. The Secretary of the Navy, through the Chief of Naval Operations, dictates the overall strategy and policy with which lower echelon Navy commands must comply. The SECNAV and CNO also are involved with funding of the Navy's environmental programs. These funds are channeled through either the major claimants (for example, Commander, U.S. Naval Air Pacific Fleet) or through the Naval Facilities Engineering Command (since some environmental programs are centrally managed and funded by NAVFAC). Most of the environmental compliance and reporting requirements are managed by NAVFAC and/or the installation's major claimant.

The Area and Regional Environmental Coordinators (such as, Commander in Chief, U.S. Pacific Fleet and Commander, U.S. Naval Base Seattle, respectively) help coordinate environmental issues on a geographic basis. They work closely with the Environmental Protection Agency and local regulatory agencies to ensure each Navy installation meets or exceeds regulatory requirements. The involvement of these commands helps to emphasize the important role that protection of the environment plays in accomplishing the Navy's mission. As is clearly represented by the Navy's organizational structure, a Navy base is not alone when trying to execute a successful Pollution Prevention Program.

The Naval Facilities Engineering Service Center (NFESC) provides specialized engineering, scientific and technical products and services on a worldwide basis in the areas of shore, ocean and waterfront facilities, amphibious and expeditionary operations, energy and utilities, and environmental engineering. The services

provided include research, consulting, and field engineering for Navy, Marine Corps, DOD customers and other Federal Agencies.

NFESC is committed to the transfer of the technology it generates to engineers and scientists throughout the Navy and Marine Corps, DOD, Government, industry, and academia. This technology transfer is accomplished through consultation and technical assistance, patent license agreements, Cooperative Research and Development Agreements (CRDAs), and through direct rapid response to the fleet.

NFESC headquarters is located on the Naval Construction Battalion Center, approximately 65 miles northwest of Los Angeles, adjacent to the deep water harbor of Port Hueneme, California. They maintain an East Coast Detachment with its headquarters at the Washington Naval Shipyard, with a second, smaller detachment at St. Julien's Creek, Portsmouth, Virginia. Its parent command is the Naval Facilities Engineering Command (NAVFAC), located in Alexandria, Virginia.

On 1 October 1993, the following commands merged to form the Naval Facilities Engineering Service Center (NFESC):

- Naval Civil Engineering Laboratory (NCEL)
- Naval Energy and Environmental Support Activity (NEESA)
- Ocean Engineering and Construction Project Office (FPO-1)
- Electronics Facilities Project Office (FPO-2)
- NAVFAC Chief Engineer's Office (FAC 04B)
- Ocean Facilities Program Office (FAC 07)

This merger enabled NFESC to provide more complete, efficient, and cost effective RDT&E, specialized engineering services, consulting, technology transfer, and field engineering. NFESC is made up of six primary directorates/departments which include: ESC10, Business Operations Directorate; ESC20, Energy and Utilities Department; ESC30, Amphibious and Expeditionary Department; ESC40, Environmental Department; ESC50, Ocean Facilities Department; and ESC60, Shore Facilities Department. The Pollution Prevention and Compliance Division, ESC 42, falls under the direction of ESC40, as do ESC41, Environmental Restoration Division, and ESC45, Tech. Implementation and Customer Liaison Office.

The Environmental Department is responsible for assembling customized technology to meet the environmental requirements of the Navy. Efforts focus on: environmental restoration, waste management, environmental

compliance, environmental data management, environmental technology transfer, pollution prevention, indoor air management, and the oil spill program. Approximately 90 people coordinate the P2 Program at NFESC. ESC421 is the Pollution Prevention Development Branch, and does P2 Research, Development, Testing, and Evaluation (RDT&E). ESC422, Engineering Support Branch, performs hands-on field support work for Navy and Marine Corps activities. This includes P2 opportunity assessments, P2 plan development, solid waste management and recycling plan development, spill contingency plans, Oil Pollution Act of 1990 (OPA 90) plans, wastewater investigations, and hazardous waste management program assistance. ESC422 also manages the Navy's oil spill program for within harbor spills. They supply and manage the Navy's oil spill equipment and provide required training.

ESC423 is called the Information and Technology Transfer Branch. Their mission is to disseminate information Navy-wide on all the pertinent P2 technologies and techniques available for Navy use. To do this, they have compiled the Pollution Prevention Technical Library an on-line clearinghouse for P2 opportunities being used within DOD. It is available through DENIX and Enviro\$en\$e, two computerized environmental information transfer sites that can be accessed through the internet or directly by modem. The hard copy version of the P2 Technical Library is called the P2 Opportunity Handbook which is a tri-service document. ESC423 also puts out a quarterly newsletter called the MINIMIZER, and assists the CNO in putting on the Navy's P2 Conference. They support the CNO in the Navy's Pollution Prevention Equipment Procurement Program. This program, which began in FY95, is a centrally managed program chartered to purchase and install equipment proven to reduce the generation of pollutants. NFESC is one of two "procurement agents," the other being NAWC Lakehurst. They are responsible for the buying and installing equipment, as well as, for training activity personnel on how to properly use and maintain the equipment.

ESC424 is the Environmental Information Systems Branch. They are the repository for Navy environmental data. They do the required data calls and assist in the analysis of the data which is submitted to CNO and Assistant Secretary of the Navy (ASN) and then to Congress. ESC425 is the NAVOSH Air Branch and is involved in indoor air quality, industrial ventilation, and asbestos maintenance and removal. ESC426 is the Clean Air Branch. They are involved in coordinating DOD inputs on proposed regulations from Title 'V' of the Clean Air Act and providing guidance on how to comply with finalized clean air requirements. They are also involved with implementing the Navy's alternative fuel vehicle program, and ambient air monitoring at Navy activities. NFESC is in the process of

standing up a new branch under the Pollution Prevention and Compliance Division, ESC427. This branch will focus on improving the acquisition procedures for the Navy by incorporating pollution prevention planning and life-cycle data into the Navy's procurement process.

NFESC is the executive manager for the Naval Environmental Protection Support Services (NEPSS) Specialty Offices specialty offices. NEPSS consists of four specialty offices, located within various commands. These offices include: Ordnance Environmental Support Office, Aircraft Environmental Support Office, Ships Environmental Support Office, and Marine Environmental Support Office. They are staffed with highly technical personnel and are tasked to provide environmental engineering, research, regulatory assistance, data management, and information exchange services for the Navy.

The major customers of NFESC are as follows: Naval Facilities Engineering Command (NAVFAC), Chief of Naval Operations (CNO), Navy Supply Corps (NAVSUP), Engineering Field Divisions (EFDs), Public Works Centers (PWCs), Naval Air Systems Command (NAVAIR), Naval Sea Systems Command (NAVSEA), Environmental Protection Agency (EPA), naval fleets, shore installations, and the Marine Corps.

6.4 NFESC's Major P2 Products and Services

Research and development of new technology:

NFESC performs significant pollution prevention research and development (R&D) using both in-house and contractor forces. Examples of recent R&D performed includes: development of a bilge oily wastewater treatment system and testing of a Supercritical Water Oxidation Unit (SCWO).

P2 equipment procurement program:

NFESC has expertise to assist in selecting, purchasing, and installing pollution prevention equipment for treating industrial and operation wastestreams, and oil spill recovery. Under NFESC's centrally procured P2 Equipment Procurement Program, proven commercial off-the-shelf pollution prevention equipment is procured that substantially reduces use of hazardous materials and generation of hazardous wastes. This program ensures P2 equipment

standardization and enables the Navy to obtain lower unit costs because of bulk purchasing of equipment. In FY95, NFESC spent \$9.7 million on over 400 different types of pollution prevention equipment in support of 100 activities.

The NFESC Oil Spill Equipment Program is designed to assist Navy activities in obtaining the equipment necessary to respond to near-shore, harbor, and land based oil spills. The types of equipment provided under the program include: skimmers - platform and utility boats, containment boom, vacuum trucks, oil spill detection systems, and ancillary oil spill equipment (NFESC 1996).

P2 acquisition management:

Although just in its early stages of development, NFESC is forming an Acquisition Branch under its Pollution Prevention and Compliance Division. This branch will help to refine the Navy's procurement procedures by insuring pollution prevention considerations are part of the acquisition process.

Development and/or review of pollution prevention plans, solid waste management plans, etc.:

Activity support projects performed in-house by NFESC include development and/or review of: Pollution Prevention Plans, Solid Waste Management Plans, Hazardous Waste Management Plans, Storm Water Pollution Prevention Plans, Water Conservation and Recycling Studies, and Spill Contingency and Prevention (SPCC) Plans.

NFESC maintains contracts that are capable of performing the following services: site assessments/equipment validation, cost benefit and pollutant reduction analysis, equipment specifications and vendor surveys, and P2 planning.

Environmental report development and analysis:

Numerous environmental reports are required to be submitted to NFESC each year from Navy and Marine Corps installations. Some of these reports include: the Solid Waste Annual Report (SWAR), Hazardous Waste Annual Report (HWAR), PCB Inventory Report, A106 (formerly the Pollution Control Report), and the Oil Spill Cleanup Equipment Report.

Environmental information systems support:

NFESC offers specialized environmental information and reports through electronic bulletin boards. It provides information and assistance on using the Defense Environmental Security Corporate Information Management (DESCIM) system or Remedial Management Information System (RMIS).

Inspections/assessments:

NFESC performs pollution prevention opportunity assessments using in-house forces and by contract. These opportunity assessments assist Navy activities by recommending material substitutions, process modifications, and other changes that will improve these activities' P2 Programs.

Industrial hygiene support:

NFESC provides indoor air quality monitoring, industrial ventilation testing, and asbestos sampling.

Ambient air monitoring services:

NFESC can provide ambient air monitoring and monitor specific discharge points for hazardous air pollutants. In addition, NFESC can perform ambient air studies.

Internet or modem sites:

The Tri-service Pollution Prevention Technical Library is a resource that provides helpful information on management practices and new technologies. The library is a compilation of lessons learned in P2 from across DOD, the private sector, industry, and academia. These lessons learned are written in an easy to read "data-sheet" format. The library contains data-sheets on: solvent substitution, ozone depleting substances, electroplating and bath-life extension, painting and paint removal technologies, wastewater management, hazardous waste management,

and solid waste management. This library can be accessed through the Defense Environmental Network Information eXchange (DENIX).

NFESC provides WorldWide Web access for all of its products and services (some portions of this site are still under construction). In addition, some specialized environmental information and reports are available through NFESC's electronic bulletin boards.

Documents produced:

The Pollution Prevention (P2) Opportunity Handbook (NFESC UG-2004-ENV) is a printed version of the P2 Technical Library that was discussed above.

The "Navy Commanding Officers Guide to Environmental Compliance" is an excellent reference for commanding officers to gain an awareness and understanding of environmental issues that will confront them. It explains the Navy's environmental organization, provides a list of questions for a commanding officer to ask their environmental staff, and tells the commanding officers where they can go for help. Through this document, the Navy is attempting to nurture a Navy-wide environmental protection ethic and give each commanding officer a tool to ensure their environmental program is effectively run. In addition, NFESC also produces other pollution prevention documents such as the Navy's Qualified Recycling Program Guidance.

Through the NEPSS, each year a Federal Environmental Contacts Directory is produced. This directory contains a listing of federal environmental personnel. The directory also includes information on environmental helplines, hotlines, and clearinghouses, plus information about DENIX. It is published by NEPSS as part of their effort to improve environmental coordination.

Management of hotlines:

NFESC does not manage a hotline service. Members of the Pollution Prevention and Compliance Division are available to provide information and answer questions.

Newsletters produced:

Each month, NFESC distributes a pollution prevention newsletter called the MINIMIZER. This newsletter contains useful information concerning the current status of the Navy's P2 Program. It publicizes: new P2 technologies and management practices, winners of the Secretary of the Defense Pollution Prevention Awards Program and other environmental award winners, deadlines for report submissions, Navy P2 success stories, upcoming conferences and training, Navy P2 contacts, and other important P2 information. Aside from its utility as a source of information, the MINIMIZER helps to keep the Navy's Pollution Prevention Program visible at the Navy installation level.

Conferences:

Each year, NFESC coordinates the Navy Pollution Prevention Conference a three day event normally held in May. This conference is intended to acquaint those in attendance with the most recent regulatory changes, new or modified reporting requirements, and the latest advances in pollution prevention technology and management practices. Members of NFESC also lecture at and participate in the Joint Service Pollution Prevention Conference and Exhibition sponsored by AFCEE.

Training:

NFESC provides several centrally funded hazardous waste and hazardous substance incident response courses throughout the year. In 1996, NFESC is hosting a joint Services recycling workshop. In addition, NFESC can provide courses to Navy activities on a reimbursable basis, through contractors that provide training on hazardous waste management and developing site specific hazardous waste training programs.

NFESC provides regional and site specific training for Facility Response Teams and operators of spill equipment. In addition, NFESC also provides on-site computer and data management training.

6.5 The Air Force Center for Environmental Excellence (AFCEE)

The AFCEE Mission is as follows: The Air Force Center for Environmental Excellence provides its customers with a complete range of world class environmental, architectural and landscape design, planning and construction management services and products (AFCEE 1996).

AFCEE is located on Brooks Air Force Base in San Antonio, Texas and its in house staff includes over 400 people in technical, scientific and support fields. This includes 70 dedicated contracting experts who work side by side with project managers to provide customer support. With nearly \$3 billion of total contract capacity, AFCEE provides Air Force activities with access to the most experienced contractors.

AFCEE was formed in 1991 as a field operating agency of The Civil Engineer of the Air Force and has six operational directorates. They are Environmental Restoration, Pollution Prevention, Environmental Conservation and Planning, Construction Management, the Design Group, and Regional Compliance. There are also four support directorates; Environmental Contracting, Mission Support, Public Affairs, and the Judge Advocate. The Center also has a full-time quality advisor and a Quality Council composed of AFCEE's senior leadership.

Since its creation, AFCEE's customer base has expanded to include some agencies outside the Air Force, including the Ballistic Missile Defense Organization, the National Aeronautic and Space Administration, the State of Texas, and others.

AFCEE, through its Environmental Restoration Directorate, manages environmental cleanup projects at both designated closure and active bases throughout the Air Force. These activities run the entire spectrum from remedial investigation to monitoring of long-term operations. In addition, AFCEE also serves as the Air Force's focal point for evaluating and applying new environmental technologies.

The Conservation and Planning Directorate provides primary execution support for the Air Force Environmental Impact Analysis Process (EIAP) and the Air Force Natural and Cultural Resource Programs. Key areas include: Environmental Impact Statements (EISs), Environmental Baseline Surveys (EBS), Environmental Assessments (EAs) and Air Force wide support of natural and cultural resources. In addition, the Directorate acts as a service center for technical consultation on air quality management and EIAP technical reviews.

The Pollution Prevention Directorate supports pollution prevention and compliance programs world-wide,

serving as a focal point for all Air Force installation pollution prevention and abatement efforts. The Directorate identifies pollution prevention/compliance opportunities; develops and executes strategic initiatives to identify and implement solutions to common Air Force pollution prevention and compliance problems; and crossfeeds information on successful programs, good ideas, and "best technologies" from throughout the Air Force and other federal agencies.

Construction Management manages military construction and medical facilities projects, and executes design and construction of military housing projects.

The Design Group provides Air Force installations with a variety of professional services, including architectural, interior, and landscape architecture and base planning. In addition, the Directorate formulates design standards.

The Center has three regional compliance offices, located in Atlanta (Eastern), Dallas (Central), and San Francisco (Western), which are responsible for keeping Air Force commanders advised of and in compliance with all applicable environmental laws and regulations.

6.6 AFCEE's Major P2 Products and Services

Research and development of new technology:

AFCEE does not perform research and development. It specializes in crossfeeding information regarding pollution prevention concepts. AFCEE uses currently available technology solutions for pollution prevention problems, and the Technology Master Process to identify new technology needs. Therefore, AFCEE focuses more on transferring technology from research and development and private industry to Air Force installations.

P2 equipment procurement program:

AFCEE does not procure equipment for Air Force installations.

P2 acquisition management:

AFCEE is currently not responsible for oversight of the USAF P2 procurement program. This responsibility falls under the Air Force Material Command and Weapon Systems Managers. Information concerning this program is contained in the Affirmative Procurement Guide which is available through PRO-ACT.

Development and/or review of pollution prevention plans, solid waste management plans, etc.:

Environmental services contracts are available to Air Force customers on a user-funded basis. In January 1995, four full-service environmental service contracts were brought on-line. Since that time, AFCEE has issued over 60 delivery orders against these contracts worth over \$17 million. Major contracts included pollution prevention studies, hazardous material/waste studies, and solid waste/recycling studies.

Environmental report development and analysis:

AFCEE offers technical guidance and assistance in developing inventories, determining thresholds, and preparing reports. It provides assistance to the Headquarters, Air Force in analyzing report data.

Environmental information systems support:

AFCEE is the USAF executive agent for the Air Force Environmental Management Information System (AF-EMIS), a Computerized Pharmacy System. AF-EMIS is a windows-based management tool used to track and control hazardous materials. AFCEE provides information about the AF-EMIS software, deployment schedule, training courses and other support.

Inspections/assessments:

Environmental Compliance and Management Program (ECAMP) assistance is provided by AFCEE. AFCEE helps to manage this program including development and maintenance of audit protocols.

Industrial hygiene support and ambient air monitoring services:

Some industrial hygiene support is provided through AFCEE by contract. Ambient air monitoring services are not provided by AFCEE.

Internet or modem sites:

AFCEE provides WorldWide Web access to all Directorate products and services (many parts of this site are still under construction).

Documents produced:

Pollution Prevention guides and other documents are published and made available through AFCEE. These documents include: Installation Pollution Prevention Program Guide, Model Shop Reports, Resource Recovery and Recycling Program Guide, HAZMAT Pharmacy Commanders' "How-to" Guide, and Installation Storm Water Program Management Guide.

Management of hotlines:**PRO-ACT**

PRO-ACT is the Air Force's environmental information clearinghouse and research service. Established by the Air Force in October 1992, PRO-ACT is designed to help Air Force personnel meet pollution prevention goals and achieve compliance with environmental regulations and initiatives.

Operated by Dynamac Corporation, PRO-ACT embodies the Air Force's commitment to stay on the leading edge of pollution prevention technology and initiatives. Because environmental compliance and source reduction issues often seem complex even to those who work in the environmental field, PRO-ACT maintains a professional staff knowledgeable in the environmental issues and laws that can impact Air Force operations. To maintain the superior level of service Air Force users have come to expect, PRO-ACT continuously taps the resources of management and operating contractors at various Air Force locations, other DOD and Federal Agencies, the U.S. EPA, state environmental agencies, national R&D laboratories and private industry.

PRO-ACT provides timely, innovative responses to inquiries from members of the U.S. Air Force, the Air Force Reserve, the Air National Guard and civilian employees. Users may ask PRO-ACT an unlimited number of questions and receive up to 40 hours of free PRO-ACT research on each topic. (Projects requiring more than 40 hours are accepted on a task order basis at the requester's expense.)

Newsletters produced:

"CrossTalk" is a monthly newsletter sponsored by AFCEE and produced by the PRO-ACT contractor. It provides information on current regulatory issues, and strongly focuses on successful pollution prevention activities being performed worldwide by Air Force installations. PRO-ACT also produces a monthly newsletter called "Fact Sheet" which distributes guidance to Air Force personnel on current environmental policies, instructions, and definitions. These fact sheets tend to focus on one element of the USAF program such as, water conservation, hazardous waste reduction, and recycling, thereby ensuring continuing visibility on Air Force P2 Program areas. AFCEE also produces a newsletter to assist users of the Air Force Environmental Management Information System (AF-EMIS).

Conferences:

Each year AFCEE hosts a conference called the Joint Service Pollution Prevention Conference and Exhibition, which was formerly known as the Annual Air Force Worldwide Pollution Prevention Conference and Exhibition. This conference serves as a forum for government, industry and academia to crossfeed pollution prevention technologies and exchange ideas, lessons learned, case histories, and success stories. Normally over 2000 people attend this three day conference.

Training:

Opportunity Assessment Workshops: A three-day, hands-on training course offered at AF installations worldwide. AFCEE provides training on complying with EPCRA, including development of toxic release inventories. In addition, AFCEE produced a storm water management video for use by activities.

6.7 Joint Organizations

Joint Group on Acquisition Pollution Prevention (JGAPP):

On 15 September 1994, the Joint Logistics Commanders chartered the Joint Group on Acquisition Pollution Prevention (JGAPP) (Enviro\$en\$e 1996). The Joint Group consists of Command Flag Officers for each military Service including the Marine Corps and Defense Logistics Agency. The Office of the Deputy Under Secretary of Defense (Environmental Security) and NASA's Director for Environmental Programs participated as invited organizations. JGAPP members are responsible for pollution prevention matters within their service acquisition community. The group coordinates joint service activities affecting pollution prevention issues identified during the weapons system's acquisition process, and supports reduction/elimination of hazardous materials by fostering joint service cooperation at contractor design, manufacturing, and remanufacturing locations.

JGAPP Achievements:

On 4 April 1996, the two first DOD block changes of technical nature were signed at Texas Instruments (TI) - Defense Systems & Electronics. One of the changes is a result of partnering efforts between Texas Instruments-Defense Systems & Electronics and the Joint Group on Acquisition Pollution Prevention (JGAPP).

The Secretary of Defense's Memorandum of 6 December 1995 directed that block changes to the management and manufacturing requirements of existing contracts be made on a facility-wide basis. The objective is to unify management and manufacturing requirements within a facility, wherever such changes are technically acceptable to the government. The block changes are meant to eliminate multiple processes, both manufacturing and management/business and to achieve cost, schedule and performance benefits for the government and the contractor.

In July of 1995, TI joined the pilot JGAPP program. TI's pilot program targeted high VOC primers and topcoats. The pilot program participants included representatives from TI and affected Army, Navy and Air Force program offices. These participants jointly decided to target high VOC primers and topcoats. During the Technical Phase, the technical representatives from TI and the associated program offices identified their individual qualification requirements, reached technical consensus on the joint testing requirements in the Joint Test Protocol (JTP) and

endorsed the technical acceptability of the primer and topcoat alternatives. The technical acceptability eliminated the need for qualification testing and facilitated the block changes.

This change will substitute TI specifications for the following military specifications: MIL-C-83286, MIL-P-23377, MIL-C-46168 Type II, and MIL-C-22750. These four military specifications affect Army, Navy and Air Force programs. The JGAPP pilot program coordinated efforts between TI and the affected program offices to reduce VOC emissions plant-wide at TI by 40-80%. This change will also be implemented at DOD depots that use those primers and topcoats. Currently, 3,458 drawings of the 151 active contracts for which TI is the prime contractor are affected. This jointly coordinated block change, will result in a cost avoidance of approximately \$5.185M.

In March 1995, McDonnell Douglas-East (MDA-E), St. Louis joined the pilot JGAPP initiative. Technical representatives from MDA-E and the program offices from affected Air Force and Navy programs targeted chromium primer applications. These representatives identified their individual program technical qualification requirements and reached technical consensus on the joint testing requirements in the Joint Test Protocol (JTP). Subsequently, the execution of the JTP was coordinated with the Business Community participating in the joint effort at MDA-E. The effort resulted in the jointly developed Statement of Tasks (SoT) required to conduct the testing in the JTP. The first jointly developed SoT was signed in January 1996.

In reaching this consensus, the participants in the joint efforts at MDA-E realized a cost avoidance of \$8.75 M. The cost avoidance is a result of the leveraging of the testing to reduce duplication in laboratory and operational testing. The participants agreed to accept the test results of a single weapon system from their respective Service to satisfy operational test requirements of multiple weapon systems.

Joint Pollution Prevention Advisory Board (JPPAB):

In accordance with the JGAPP charter, the Joint Pollution Prevention Advisory Group (JPPAB) was formally chartered in 1995. The Advisory Board provides technical and programmatic support to the JGAPP and manages, coordinates, and executes the tasks in the JGAPP's Action Plan. Board members are responsible for coordinating all the activities within their respective service and identifying required resources. The Advisory Board consists of a member from the following organizations: Director of Requirements, HQ Air Force Materiel Command; Army

Acquisition Pollution Prevention Support Office HQ Army Materiel Command, Chief of Naval Operations, Environmental Protection, Safety and Occupational Health Division; Deputy Director for Acquisition, Flight Operations, Specialized Safety, and Environmental Team, Defense Logistics Agency; and the Systems Engineering Branch, Marine Corps Systems Command.

Tri-Service Environmental Support Centers Coordinating Committee:

A charter signed in October by representatives of the Army, Navy and Air Force environmental support centers expands the framework for an increasing amount of tri-service cooperation on environmental programs. The military services had been working together in several environmental areas even before this working agreement was put to paper.

The charter for the Tri-Service Environmental Support Centers Coordinating Committee formally establishes the active involvement of the Army, Navy and Air Force environmental support center commanders. This group is comprised of the commanders and key staff from the Army Environmental Center (AEC), the Naval Facilities Engineering Service Center (NFESC) and the Air Force Center for Environmental Excellence (AFCEE). It formalizes the wide-ranging discussions of environmental issues that take place at committee meetings. The group addresses issues that relate to the primary elements of the Defense Department's environmental program: pollution prevention, compliance, conservation, and restoration, as well as technology development and transfer, regulatory issues and related environmental matters.

The tri-service committee is an outgrowth of the Installation Restoration Technology Coordinating Committee, which later became the Environmental Technology Transfer Committee. These groups focused primarily on development, demonstration and transfer of environmental technologies for military use. Since that time, the tri-service committee members have come together to cooperate on a much broader range of issues, including joint environmental workshops, inter-service efforts to promote pollution prevention, tri-service cooperation in working with regulators, providing tri-service input on proposed federal and state regulations, and joint information-exchange and public affairs programs.

6.9 Conclusion

Table 6.1 (on the next page) is a summary of the primary services provided by AEC, NFESC, and AFCEE. This matrix of P2 products and services is intended to give the reader a broad overview of each support organization's P2 products and services and is not intended to be all-inclusive.

Table 6.1: Matrix of Services Provided			
	AEC	NFESC	AFCEE
Research, development, review of new technology	NP	IH/CT	NP
P2 equipment procurement program	NP	IH/CT	NP
P2 acquisition management	NP	IH/CT	NP
Development and/or review of pollution prevention plans, solid waste management plans, etc.	CT (not frequent)	IH (normally) or CT	CT (frequent)
Environ. report develop. and analysis	IH	IH	IH
Environmental information systems support	IH/CT	IH/CT	IH/CT
Inspections/assessments	CT	IH/CT	IH/CT
Industrial hygiene support	NP	IH	CT
Ambient air monitoring services	NP	IH	NP
Internet or modem sites	IH	IH	IH
Documents produced	CT	IH/CT	IH/CT
Management of hotlines	CT	NP	CT
Newsletters produced	CT	IH	CT
Conferences	NP	IH/CT	IH/CT
Training	NP	IH/CT	IH/CT

NP=Not Provided IH=Provided In-house CT=Provided by Contract

CHAPTER 7: Recommendations for Improvement

In its first Toxic Release Inventory (TRI) reporting year, DOD released and transferred 11.9 million pounds of toxic chemicals. According to the DOD report, air emissions represented 97 percent of all toxic chemical releases. DOD's releases stem mainly from maintenance activities such as painting and depainting aircraft and other equipment, cleaning and degreasing. Methylene chloride accounted for 20 percent of DOD's releases. It should be noted that the DOD report includes emissions of TRI chemicals from Government-Owned-Contractor-Operated Facilities (GOCOs). It is obvious from this data that the successful implementation of the DOD Pollution Prevention Program represents an enormous undertaking.

The three Military Departments are doing an excellent job of coordinating their respective programs and achieving tremendous reductions in solid and hazardous waste generation. Obviously, there is still more work to be done. In a November 1994 General Accounting Office (GAO) report, the GAO concluded that much of the reported DOD hazardous waste reductions have been achieved through reducing volume, but not the toxicity of hazardous waste. Making the required reductions in the use of toxic chemicals will require more research, development, test, and evaluation to identify potential substitute processes and materials.

This chapter is broken down into four sections that discuss recommendations for improvement of DOD's P2 Program. These sections are management, funding, procurement, and education and awareness. Following these recommendations will allow DOD to continue to build upon its already impressive Pollution Prevention Program.

7.1 Management

The following recommendations should be implemented to improve how DOD manages its Pollution Prevention Program. In some cases illustrations are provided to help the reader visualize the concepts being discussed.

- DOD's past reporting on hazardous waste disposal does not measure how much of the reductions in these disposals are due to reductions in the use of toxic chemicals or to other factors such as defense downsizing. These reported reductions in hazardous waste disposal also include reductions in waste volume achieved through such techniques as dehydration of the waste. DOD's reporting systems must be modified to ensure hazardous waste disposal reductions can be separated into categories that reflect exactly how the reductions take place (GAO 1994).

- The Army is currently in the process of testing a new HM control and tracking management information system at several of its installations called HSMS (this system was discussed in chapter three). By using this system, the Army will be adopting HM control and tracking procedures similar to the Navy and Air Force pharmacy approach. The Army should establish HAZMAT Pharmacies similar to the Navy and Air Force. The Navy's current primary software for executing its HM management is called Hazardous Inventory Control System (HICS). The Air Force's current primary software for executing its HM management is called Air Force Environmental Management Information System (AF-EMIS). There are actually about 53 redundant systems currently in use throughout DOD and an effort is underway to convert all DOD activities to HSMS (GAO 1994). This process should be continued as long as HSMS proves to be an effective HM management tool and can match with the three Service's supply procedures.
- A strong and focused effort must be made to review military specifications and standards that call for use of toxic chemicals in repairing and maintaining weapon systems and facilities. Less toxic or non-toxic substitutes and alternatives should be used wherever possible. In addition, use of commercial practices and performance-based specifications, minimizing use of military specifications and standards, will ultimately save DOD money and result in less hazardous substances being used (GAO 1994).
- A Pollution Prevention Manager should be established at each military installation. This position would focus on the installation's P2 Program rather than compliance and other environmental issues.
- Teamwork should be encouraged through management responsiveness to pollution prevention suggestions by the workforce.
- Institute, in consultation with the other Services, a "maximum profit/minimum loss" criterion for deciding when installations should enter into their own recycling or waste disposal contracts in lieu of the current mandate to always use Defense Re-utilization and Marketing Office/Defense Re-utilization and Marketing Service (DRMO/DRMS) services (Enviro\$en\$e 1996).
- Strengthen existing systems and develop new systems for information dissemination on P2 methods, case studies, and new technology.
- Continue to pursue elimination of possible organizational and contractual redundancies among the three Services. For example, determine whether both AEC and AFCEE require a P2 Hotline. A Tri-service Pollution Prevention Hotline may just as effectively provide information and answer concerning military P2 issues.
- Improve internal and external communication. As shown in Appendix 'G,' there are numerous players involved with the prevention of pollution. Each area of expertise shown in Figure 7.1 is an important ingredient in how an installation implements its P2 Program. A continual effort must be made to have these groups coordinate their efforts to ensure the effectiveness of an installation's program is maximized.
- To the maximum extent practical, standardize each Service's P2 Program elements. Appendix 'H' (Figure 7.2) is a flow chart of how policy and baseline data effect the pollution prevention process. Policy, program elements, and reporting requirements should be very similar among the three Services. Efforts to link-up and standardize the three Services' programs are currently underway.
- Improve management of pollution prevention information and increase internal and external performance of opportunity assessments. As is shown in Figure 7.3 (Appendix 'I'), a tremendous amount of information is required to properly assess the adequacy of an installation's P2 efforts. Data that is generated for reporting requirements must be thoroughly reviewed and used as a gauge for program success. Increase opportunity assessments will lead to improved operating practices and greater visibility at installations. Figure 7.4 (Appendix 'J') is a listing of the type of improvements in operating practices that can be made.

7.2 Funding

The following recommendations should be implemented to improve how DOD provides funding for its Pollution Prevention Program.

- Bring pollution prevention under the “must fund” definition for environmental funding, in anticipation of more intensive regulatory requirements (Enviro\$en\$e 1996).
- Promulgate clear definitions and guidance for crediting (or charging) proposed P2 projects with various benefits (or drawbacks) under existing funding sources to add clarity and speed to installation program execution (Enviro\$en\$e 1996).
- For the Navy, for activities that utilize the Defense Base Operating Fund (DBOF), it is difficult for NFESC to provide equipment from the centrally funded equipment program. Due to the nature of DBOF funding requirements, a DBOF activity normally must buy its P2 equipment from NFESC. Therefore, there is much less incentive for a DBOF activity to acquire this equipment. In addition accounting rules, such as depreciation, make a DBOF activity less inclined to buy P2 equipment. DOD should allow for an exception to typical DBOF funding policy so that equipment can be purchased by NFESC and distributed to DBOF activities “free of charge.” In addition, accounting rules should be modified so that DBOF activities are not penalized by acquiring and using new P2 equipment.
- Contractual incentives and flexibilities should be added to government contracting procedures to encourage government contractors to undertake P2 initiatives for their activities at installations and GOCOs (GAO 1994).

7.3 Procurement

The following recommendations should be implemented to improve how DOD procures weapons, material and equipment for its Pollution Prevention Program.

- DOD must systematically revise its procurement regulations to address environmental pollution concerns. Program managers and acquisition specialists should challenge acquisition requirements that create unique military specifications. An appropriate “life-cycle model” should be implemented for military industrial products, which includes environmental costs such as disposal and treatment. This model should also include “hidden” environmental costs, such as those associated with compliance, reporting, and monitoring activities (GAO 1994). Appendix ‘K’ is a diagram that illustrates various factors that impact upon life-cycle costs.
- Approval time should be decreased for product substitutions. Consideration should be given to provide installations with the knowledge and authority to make reasonable material substitutions without unnecessarily lengthy approval processes for each proposal (Enviro\$en\$e 1996).
- Contract wording changes (generic and contract specific) should be made to empower both the government and contractor to easily undertake mutually beneficial projects and activities (Enviro\$en\$e 1996).
- For the Navy, streamline NFESC acquisition procedures to decrease lead-time associated with the production and distribution of P2 equipment.

- Develop and implement uniform systems for “cradle to grave” tracking of all potentially harmful but unregulated installation procurements. This action would reduce redundant purchasing, product on-shelf expiration, and disposal costs.

7.4 Education and Awareness

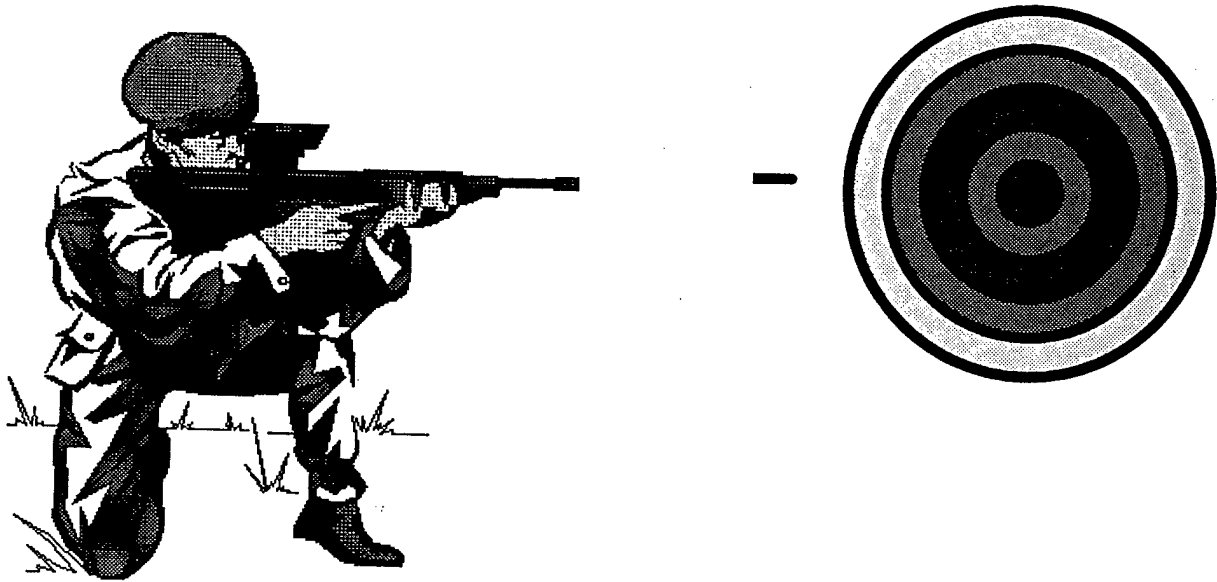
The following recommendations should be implemented to improve how DOD educates its personnel and the public about the DOD Pollution Prevention Program.

- Promote and apply the good will of government and contractor employees to spread the message that DOD is committed to a strong P2 program. Ensure each installation’s information and public affairs program advertises P2 efforts being taken and program accomplishments (Enviro\$en\$e 1996).
- Conduct education and training programs to enhance the capability and skill base of military industrial facility managers in the area of pollution prevention and alternative manufacturing technologies.
- Implement an effective technology transfer mechanism that increases the awareness of and benefits from various technology alternatives associated with production processes (Enviro\$en\$e 1996).

7.5 Conclusion

As stated in the Preface, the purpose of this report was to analyze how DOD implements a pollution prevention program through the three military services, the Army, Navy (including Marine Corps), and Air Force. The report provides the reader with a thorough review of the authority through which military activities implement a P2 Program, the organization through which these programs are implemented, and the functions and responsibilities of the elements within the organizations. The final chapter provides some recommendations for improvement that can help strengthen the already solid DOD P2 Program.

The author is extremely grateful for the tremendous support that was provided by members of the AEC, NFESC, and AFCEE staff whose information and guidance made this report possible. Because of the top-level commitment of DOD’s leadership concerning the environment and the tremendous competency of the three Services’ environmental support organizations and staff, the future of DOD’s environmental program looks extremely bright.



DOD Pollution Prevention, “Aiming for Success”

Appendices

Pollution Prevention Hierarchy

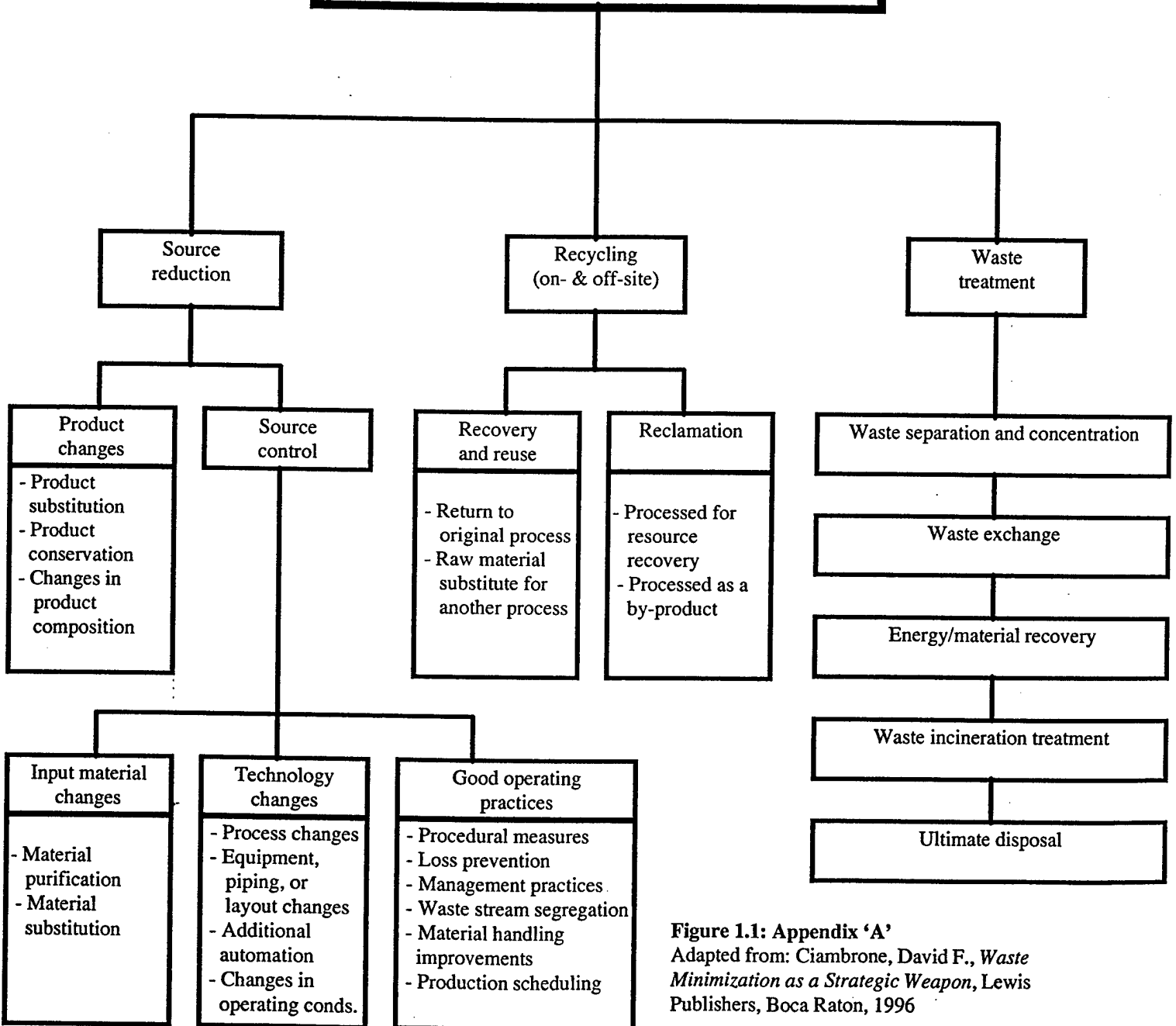
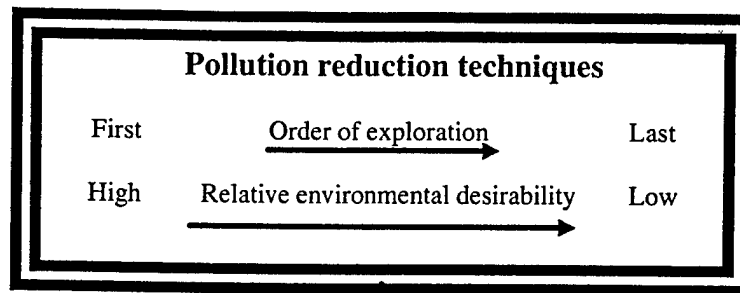


Figure 1.1: Appendix 'A'
Adapted from: Ciambrone, David F., *Waste Minimization as a Strategic Weapon*, Lewis Publishers, Boca Raton, 1996

Figure 1.2: HAZARDOUS MATERIALS DIAGRAM

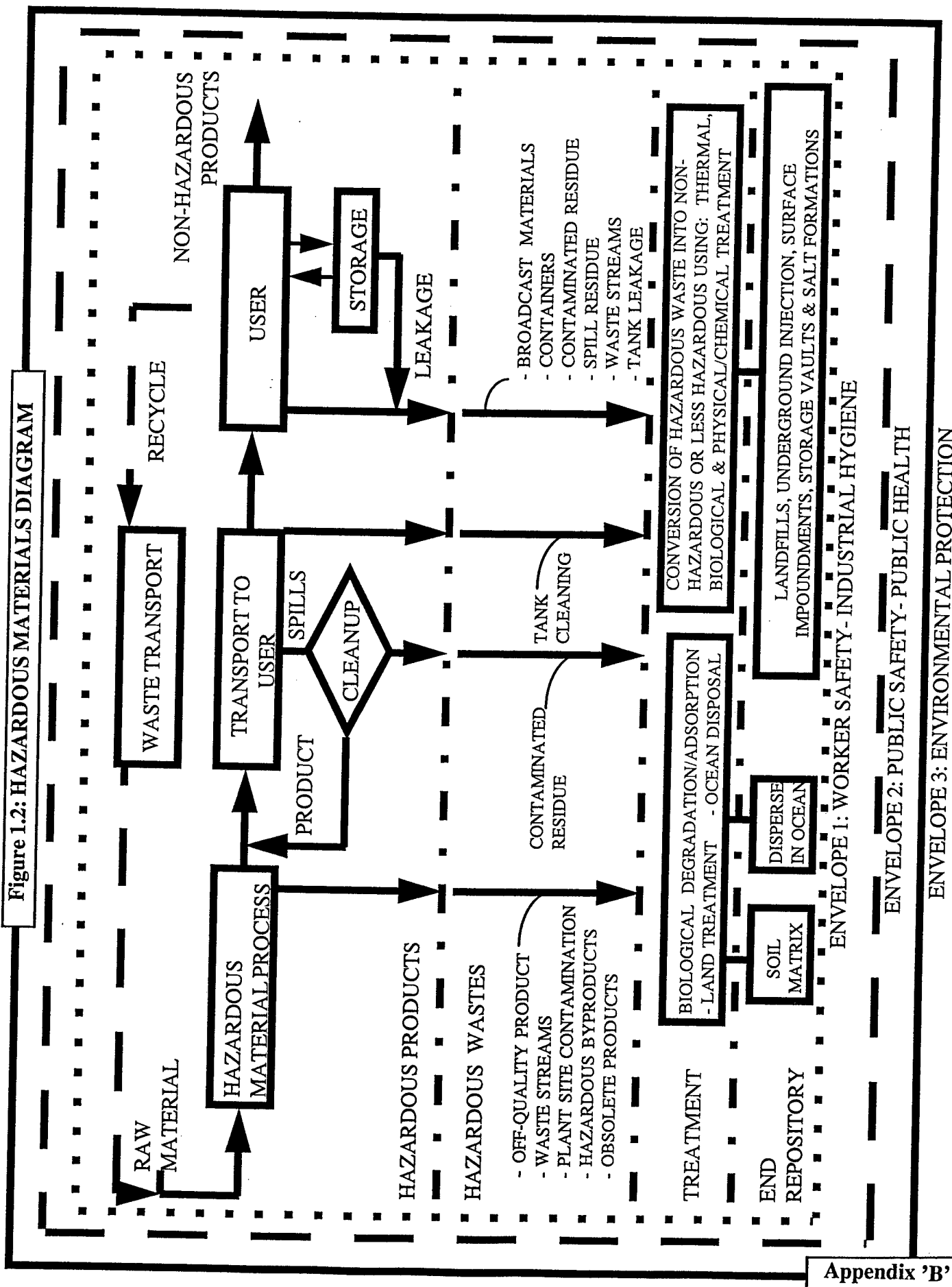
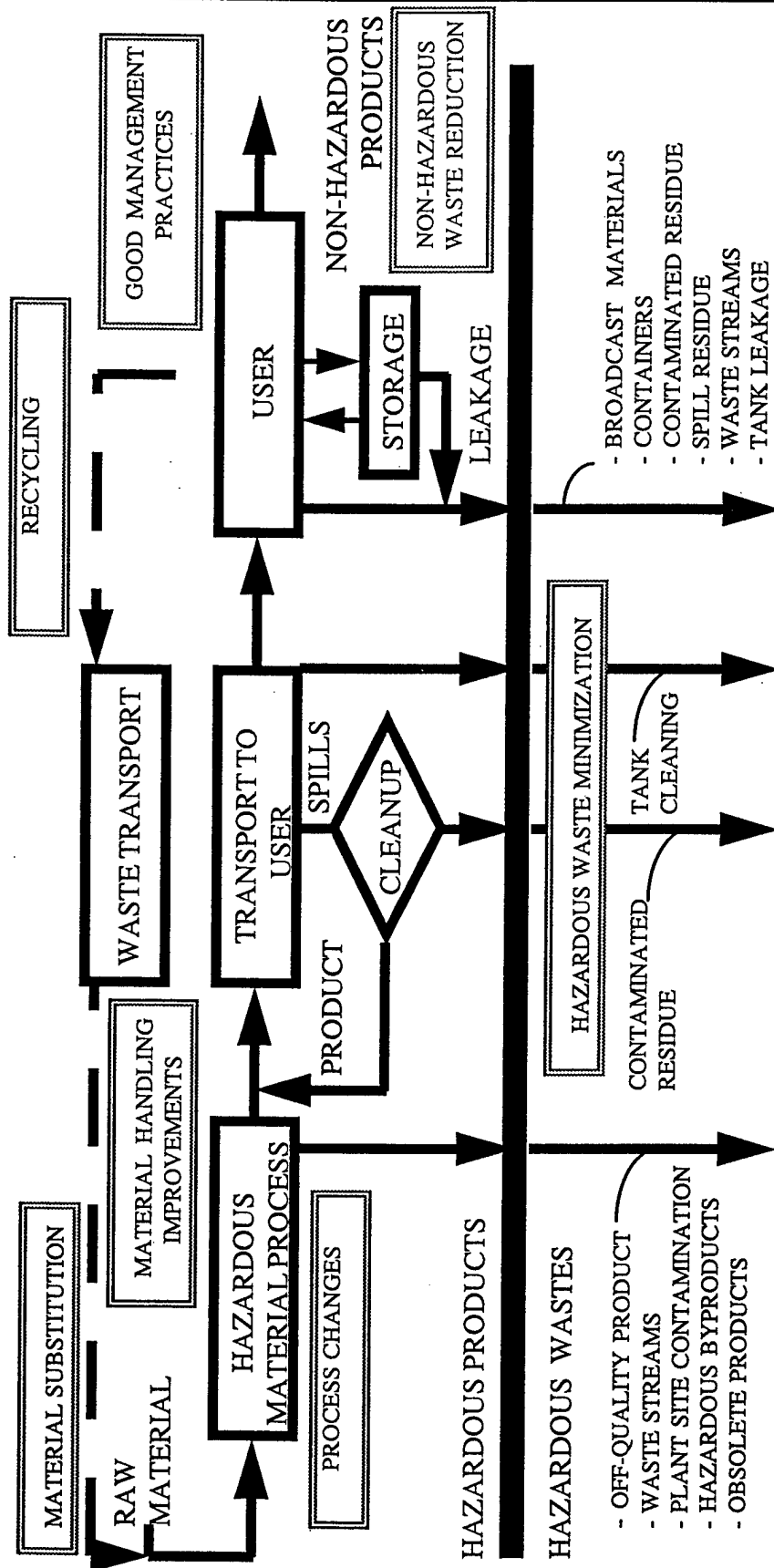


Figure 1.3: POLLUTION PREVENTION DIAGRAM



GOAL IS TO REDUCE ALL WASTE STREAMS THROUGH IMPLEMENTATION OF WASTE MINIMIZATION TECHNOLOGIES AND PROCEDURES.

TRAINING

Major Steps of Implementing a P2 Program

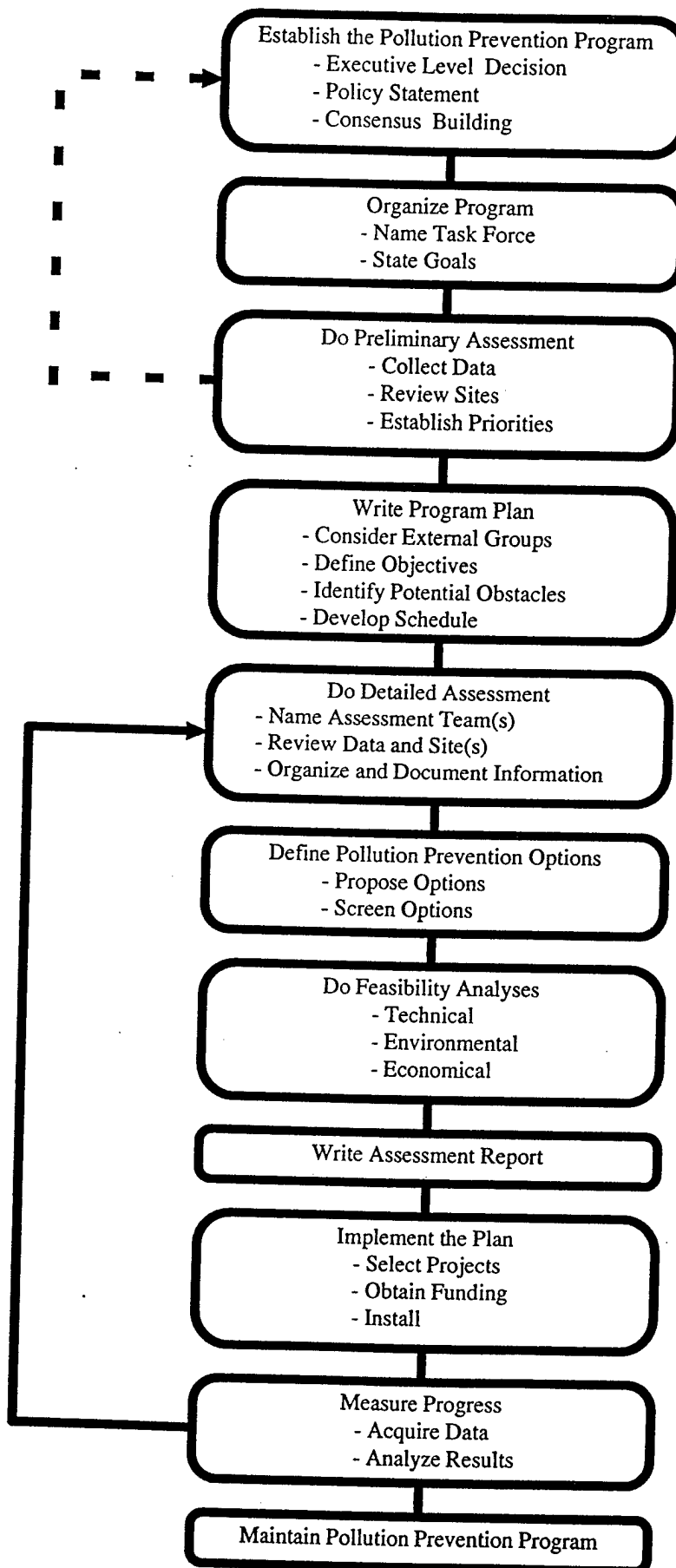
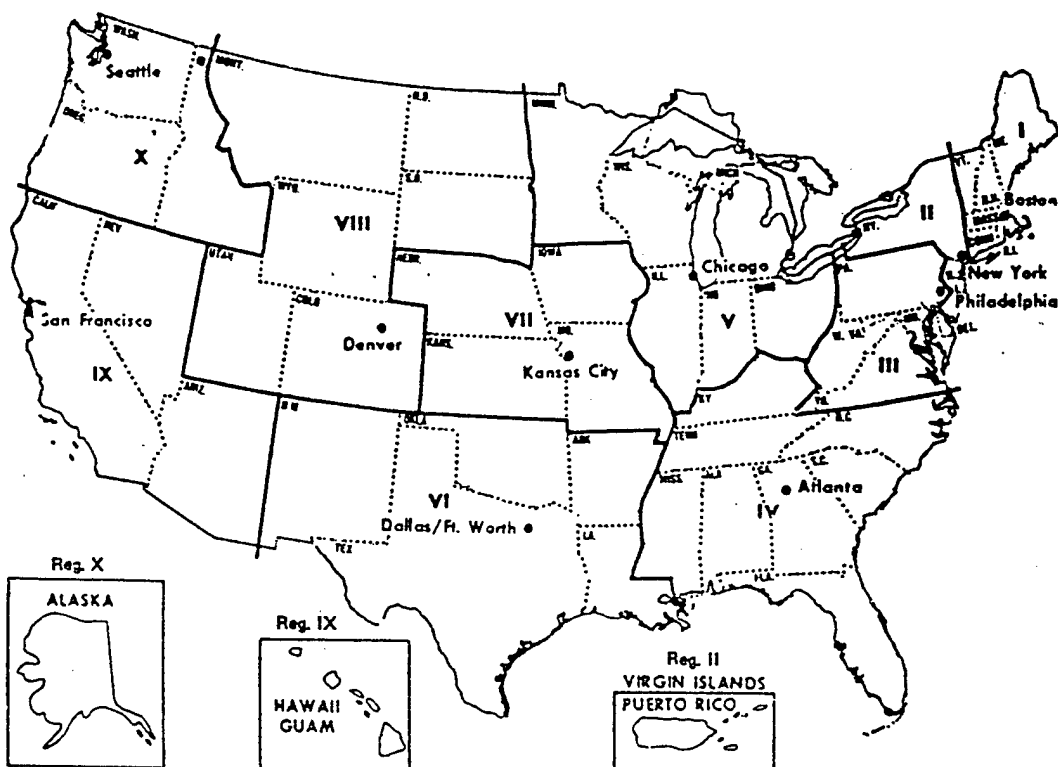


Figure 1.4 - Appendix 'D'

NIOSH, OSHA, AND EPA REGIONS



- | | |
|-------------------|--------------------|
| 4 - Alabama | 9 - Nevada |
| 10- Alaska | 1 - New Hampshire |
| 9 - Arizona | 2 - New Jersey |
| 6 - Arkansas | 6 - New Mexico |
| 9 - California | 2 - New York |
| 8 - Colorado | 4 - North Carolina |
| 1 - Connecticut | 8 - North Dakota |
| 3 - Delaware | 5 - Ohio |
| 3 - D.C. | 6 - Oklahoma |
| 4 - Florida | 10- Oregon |
| 4 - Georgia | 3 - Pennsylvania |
| 9 - Hawaii | 1 - Rhode Island |
| 10- Idaho | 4 - South Carolina |
| 5 - Illinois | 8 - South Dakota |
| 5 - Indiana | 4 - Tennessee |
| 7 - Iowa | 6 - Texas |
| 7 - Kansas | 8 - Utah |
| 4 - Kentucky | 1 - Vermont |
| 6 - Louisiana | 3 - Virginia |
| 1 - Maine | 10- Washington |
| 3 - Maryland | 3 - West Virginia |
| 1 - Massachusetts | 5 - Wisconsin |
| 5 - Michigan | 8 - Wyoming |
| 5 - Minnesota | 9 - American Samoa |
| 4 - Mississippi | 9 - Guam |
| 7 - Missouri | 2 - Puerto Rico |
| 8 - Montana | 2 - Virgin Island |
| 7 - Nebraska | |

Appendix 'E'

DOD and GSA Pollution Prevention Hotlines

Department of Defense Environmental and Pollution Prevention Information Lines

Various elements of DOD operate telephone assistance lines to provide information about environmental matters. These information lines respond to a full range of environmental questions, including pollution prevention. If the information line staffs cannot answer the question, they typically refer the caller to the appropriate agency. Some information lines operate in general support of the Department of Defense; others tend to specialize in providing support to the sponsoring Military Department or subordinate command.

Additional information lines are likely to be added by other Department of Defense organizations; callers should request information on other information lines.

Department of Defense

Hazardous Technical Information Services (HTIS) (800) 848-4847 or (804) 279-5168

The Hazardous Technical Information Services (HTIS), an organization operated by the Defense Logistics Agency's Defense General Supply Center, operates an information line in support of Department of Defense activities world-wide. The purpose of the information line is to answer questions about hazardous materials, including regulatory, technical, safety, industrial hygiene, substitution, and disposal questions.

The HTIS publishes a bimonthly Bulletin which is available upon request. Contractors working for DOD can request the Bulletin or request information through the Defense Agency or Military Department they are supporting.

The HTIS has published and is making available an Environmentally Preferable Products Catalogue, which lists hundreds of environmentally preferred products which are less polluting. The point of contact for requesting the Catalogue is Mr. Steve Perez, at (800) 345-6333 or (804) 279-6045.

Department of the Army

Army Environmental Center (800) 872-3845

The Army Environmental Center operates an environmental information response line for Army organizations world-wide. The response line can answer questions about pollution prevention, or can refer callers to the appropriate Army subject matter expert or agency for assistance. Army organizations can obtain information and assistance about pollution prevention. Contractors working for Army organizations can request assistance; it is preferred if they forward requests through a representative of the Army organization they are supporting.

Headquarters, Forces Command (404) 669 7513 or DSN 367-7513/7477

Forces Command (FORSCOM) is a Major Command (MACOM) of the Army. Most Army ground forces, and many large installations, are assigned to FORSCOM. The FORSCOM environmental hotline is an internal FORSCOM support element operating in direct support of FORSCOM installations. The hotline can provide FORSCOM installations with information about pollution prevention.

(DOD and GSA Pollution Prevention Hotlines Continued)

Department of the Army Continued

United States Army Corps of Engineers - Construction Engineering Research Laboratories DENIX Technical Assistance Center (800) 864-4733, or (217) 373-4519/4420.

The United States Army Construction Engineering Laboratory (USACERL) operates a technical assistance center in support of the DENIX (Defense Environmental Information Exchange) system. DENIX is the Department of Defense environmental information bulletin board, and includes information on pollution prevention. The POC for this assistance line is Ms. Kim Grein.

Department of the Navy

Navy Sea Systems Command (NAVSEA) CFC Halon/Clearinghouse (703) 769-1883

The CFC Halon Clearinghouse is a Navy assistance program intended to provide Navy organizations and activities world-wide information on ozone-depleting substances (ODS), and assistance in meeting compliance or pollution prevention goals. The Clearinghouse has done extensive technical reviews of military specifications, and maintains a data base of military specifications which require ODS. The Clearinghouse publishes a quarterly newsletter, available upon request to Navy activities, and is presently soliciting feedback from Navy activities on the effectiveness of ODS substitution efforts. The Clearinghouse is linked to North Atlantic Treaty Alliance (NATO) and United Nations (UN) ODS programs.

Department of the Air Force

Air Force Center for Environmental Excellence (800) 233-4356, DSN 240-4214, (210) 536-4214.

The Headquarters Air Force Center for Environmental Excellence operates an environmental information exchange known as PRO-ACT. This service provides environmental information, including information on pollution prevention, to Air Force organizations and contractors world-wide. They have a wide range of information and products pertaining to pollution prevention, and can provide information on other Air Force environmental programs.

General Services Administration

Although not a DOD information line, the General Services Administration (GSA) operates a shelf life information line, from which Federal Agencies can obtain information on the shelf life of GSA procured materials.

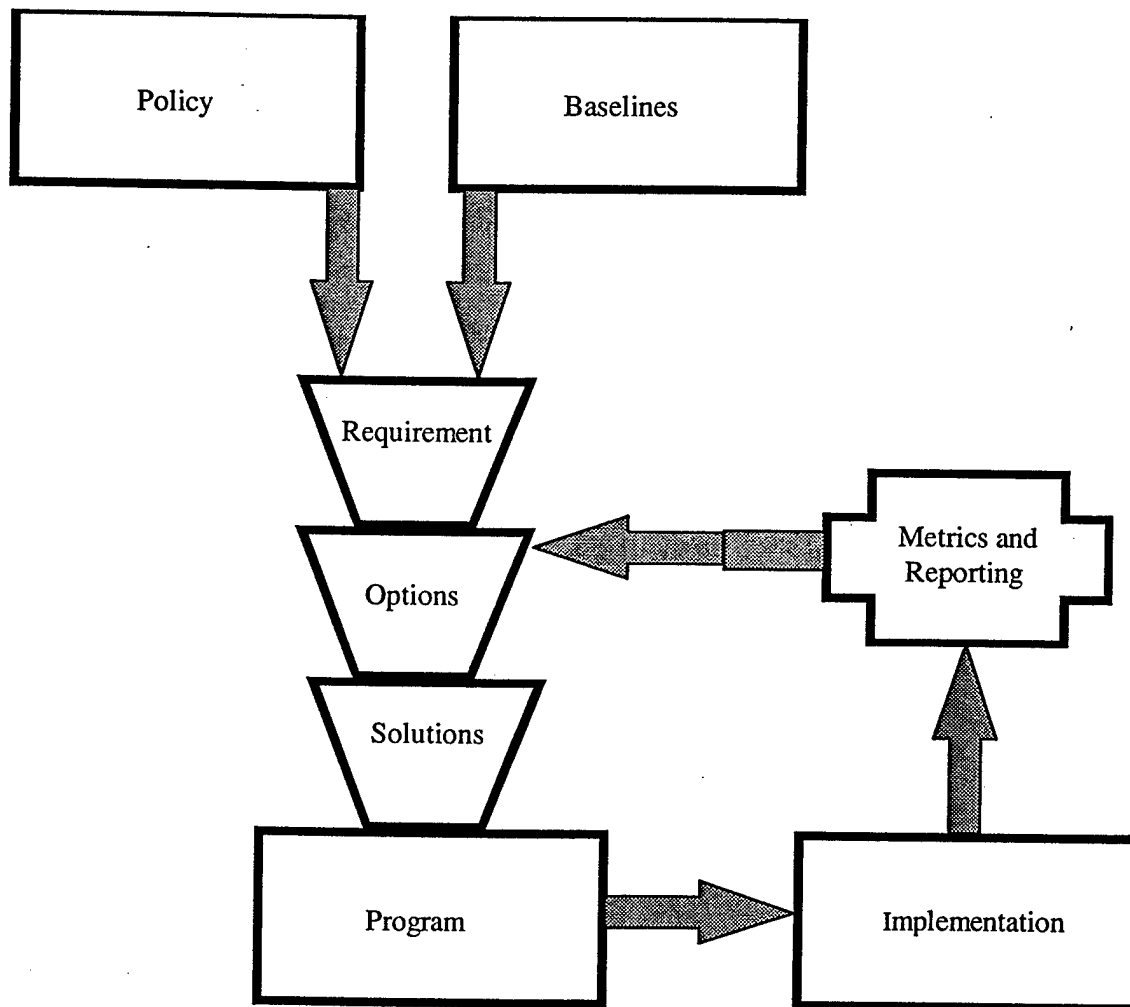
The GSA Shelf-Life Hotline is a service which GSA provides to Federal Agencies. The Hotline can provide federal customers information on shelf-life extensions. Hotline staff will need to know the National Stock Number (NSN), batch number, and date of manufacture of the item. If the item has been tested and has had the shelf-life extended, the Hotline staff can provide the information to the customer.

Figure 7.1: Key Expertise Required to Implement a Pollution Prevention Program



Appendix 'G'

Figure 7.2: The Pollution Prevention Process



Source: U.S. Air Force, Installation Program Guide, August 1995, p.2-3

Appendix 'H'

Information Needed for a Pollution Prevention Assessment

1. Design Information



- Process flow diagrams
- Process descriptions
- Material & energy balances
- Operating Manuals
- Equipment specs. & data
- Piping & instrument diagrams
- Plot and elevation plans
- Equipment layouts

2. Environmental Information



- Waste manifests & disposal records
- Waste characterization
- Wastewater discharge records
- Emission limits & discharge consents
- Air emission records
- Environmental reports

3. Raw Material/Production Information



- Material safety data sheets
- Product & raw-material inventory records
- Operator data logs
- Production schedules

4. Other Information



- Treatment & disposal costs
- Water & sewage charges
- Company environmental policy statements

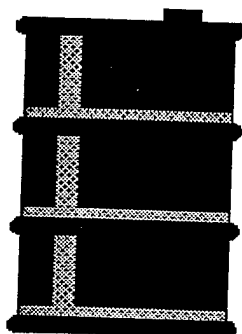


Figure 7.3

Appendix 'I'
Adapted from: Higgins, Thomas E., *Pollution Prevention Handbook*, Lewis Publishers, Boca Raton, 1995, p. 81

Figure 7.4: Pollution Prevention through Good Operating Practices

Waste segregation

- Prevent mixing of hazardous wastes with non-hazardous wastes.
- Store materials in compatible groups.
- Segregate different solvents.
- Isolate liquid wastes from solid wastes.

Preventative maintenance programs

- Maintain equipment history cards on equipment location, characteristics, and maintenance.
- Maintain a master preventative maintenance schedule.
- Keep vendor maintenance manuals handy.
- Maintain a manual or computerized repair history file.

Training and awareness-building programs

Provide training for:

- Operation of equipment to minimize energy use and material waste.
- Proper materials handling to reduce waste and spills.
- Awareness of the importance of pollution prevention by explaining the benefits of P2.
- Detecting and minimizing material loss to air, water, or land.
- Emergency procedures to minimize lost materials during accidents.

Effective supervision

- Closer supervision may improve production efficiency and reduce inadvertent waste generation.
- Centralize waste management. Establish P2 goals and perform P2 assessments.

Employee participation

- Free forums between employees and supervisors can help identify ways to reduce waste.
- Solicit and reward employee suggestions for waste reduction ideas.

Production planning and scheduling

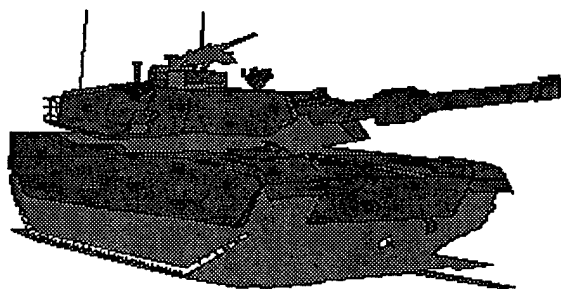
- Maximize batch size to reduce clean-out waste.
- Dedicate equipment to a single product.
- Alter batch sequencing to minimize cleaning frequency.

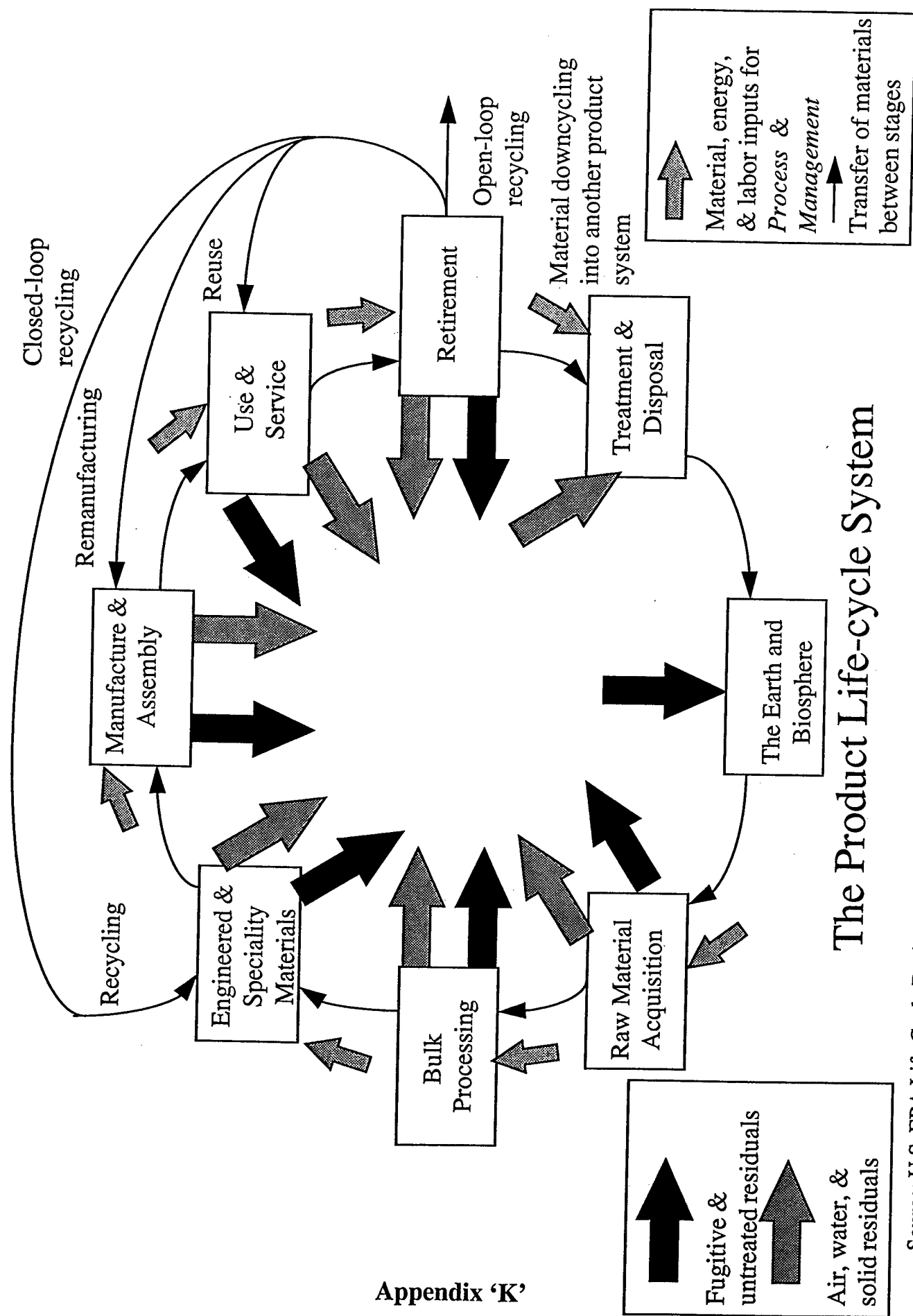
Cost allocation and accounting

- Charge direct and indirect costs of all air, land, and water discharges to specific processes or products.
- Allocate waste treatment and disposal costs to the operations that generate the waste.
- Allocate utility costs to specific processes or products.

Appendix 'J'

Source: U.S. EPA, *Environmental Protection Agency Pollution Prevention Directive*, May 13, 1990





Appendix 'K'

ACRONYMs

Note: Each acronym is defined in its initial use during the report. In addition, not all acronyms shown below were used within this report.

AAPPSO: Army Acquisition Pollution Prevention Support Office
ACNO: Assistant Chief of Naval Operations
AEC: Army Environmental Center
AECs: Area Environmental Coordinators
AEPI: Army Environmental Policy Institute
AFCEE: Air Force Center for Environmental Excellence
AFCEA: Air Force Civil Engineering Support Agency
AFI: Air Force Instruction
AFPMB: Armed Forces Pest Management Board
AMC: Army Materiel Command
AMEDD: Army Medical Department
ARARs: Applicable or relevant and appropriate requirements
ASA (FM): Assistant Secretary of the Army for Financial Management
ASA (I,L&E): Assistant Secretary of the Army for Installations, Logistics, and Environ.
ASAP-PP: Army Environmental Strategy Action Plan - Pollution Prevention
ASA (R,D&A): Assistant Secretary of the Army for Research, Develop. and Acquisition
ASCIM: Assistant Chief of Staff for Installation Management
ASN (I&E): Assistant Secretary of the Navy for (Installations and the Environment)
AUL: Authorized Use List
CAA: Clean Air Act
CEC: Civil Engineering Corps
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act
CFC: Chlorofluorocarbon
CFR: Code of Federal Regulations
CHRRMP: Consolidated Hazardous Material Re-utilization and Inventory Management Program
CINC: Commander in Chief
CINCLANTFLT: Commander in Chief, U.S. Atlantic Fleet
CINCPACFLT: Commander in Chief, U.S. Pacific Fleet
CNET: Chief of Naval Education and Training
CNO: Chief of Naval Operations
CO: Commanding Officer
COE: Corps of Engineers, Army or Army Chief of Engineers
COMNAVFACENGCOM: Commander, Naval Facilities Engineering Command
COMNAVSUPSYSCOM: Commander, Naval Supply System Command
COMSC: Commander, Military Sealift Command
CONUS: Continental United States
COTR: Contracting Officer's Technical Representative
CRDAs: Cooperative Research and Development Agreements
CSA: Chief of Staff, Army
CWA: Clean Water Act
CY: Calendar year
DASAF: Director of Army Safety
DCNO: Deputy Chief of Naval Operations
DCSLOG: Deputy Chief of Staff for Logistics
DCSOPS: Deputy Chief of Staff for Operations
DeCA: Defense Commissary Agency
DECIM: Defense Environmental Corporate Information Management
DENIX: Defense Environmental Network Information eXchange
DERA: Defense Environmental Restoration Account

DFAS: Defense Finance and Accounting System
DLA: Defense Logistics Agency
DOD: Department of Defense
DON: Department of the Navy
DOT: Department of Transportation
DRMO: Defense Re-utilization and Marketing Office
DRMS: Defense Re-utilization and Marketing Service
DUSD(ES): Deputy Under Secretary of Defense (Environmental Security)
EA: Executive Agent
EAs: Environmental Assessments
EBS: Environmental Baseline Surveys
ECO: Energy Conservation Opportunity
EFA: Engineering Field Activity
EFD: Engineering Field Division
EIS: Environmental Impact Statements
EO: Executive Order
EPA: Environmental Protection Agency
EPCRA: Emergency Planning and Community Right-to-Know Act
ETSC: (Air Force) Environmental Technology Support Center
FAR: Federal Acquisition Regulations
FR: Federal Register
FFCA: Federal Facility Compliance Act
FIFRA: Federal Insecticide, Fungicide, and Rodenticide Act
FWPCA: Federal Water Pollution Control Act
FY: Fiscal Year
GOCO: Government-Owned-Contractor-Operated Facilities
GSA: General Services Administration
HAZCOM: Hazard Communication
HAZMIN: Hazardous Waste Minimization
HAZWOPER: Hazardous Waste Operations and Emergency Response
HM: Hazardous Material
HMC&M: Hazardous Material Control and Management
HMIS: Hazardous Material Information System
HQ AFMC/EN: Air Force Material Command's Director of Engineering and Tech. Management
HQ USAF/CE: Air Force Civil Engineer
HQ USAF/LG: Deputy Air Force Chief of Staff for Logistics
HQ USAF/RE: Office of the Air Force Reserve
HS: Hazardous Substance
HSMS: Hazardous Substance Management System
HSWA: Hazardous and Solid Waste Amendments
HW: Hazardous Waste
IG: Inspector General
JAG: Judge Advocate General
JGAPP: Joint Group on Acquisition Pollution Prevention
JPPAB: Joint Pollution Prevention Advisory Board
JTP: Joint Test Protocol
LEPC: Local Emergency Planning Committee
MACOM: Major (Army) Command
MAJCOM: Major (Air Force) Command
MARCORPS: U.S. Marine Corps
MATDEV: Material Developer
METLs: Mission Essential Task Lists
MILSPECs: Military Specifications
MILSTDs: Military Standards

MSC: Military Sealift Command
MSDS: Material Safety Data Sheet
MTMC: Military Traffic Management Command
NAAQS: National Ambient Air Quality Standards
NAS: National Aerospace Standard
NAVAIRSYSCOM: Naval Air Systems Command
NAVCOMPT: Comptroller of the Navy
NAVFACENGCOM: Naval Facilities Engineering Command
NAVOSH: Navy Occupational Safety and Health
NAVSEASYSYSCOM: Naval Sea Systems Command
NAVSPAWARSYSCOM: Naval Space and Warfare Systems Command
NAVSUPSYSCOM: Naval Supply Systems Command
NDCEE: National Defense Center for Environmental Excellence
NEPSS: Naval Environmental Protection Support Service
NESHAP: National Emission Standards for Hazardous Air Pollutants
NFESC: Naval Facilities Engineering Services Center
NGB/CF: National Guard Bureau
NOTAL: Not to All
NPDES: National Pollutant Discharge Elimination System
NSPS: New Source Performance Standards
N45: Environmental Protection Safety and Occupational Health Division
OASN (I&E): Office of Assistant Secretary of the Navy (Installations & Environment)
ODC: Ozone-Depleting Chemical
ODS: Ozone-Depleting Substance
OIG: Office of the Inspector General
O&M: Operations and Maintenance
OPA: Oil Pollution Act
OPNAV: Office of the Chief of Naval Operations
OPNAVINST: CNO instruction
OSC: On-Scene Coordinator
OSD: Office of the Secretary of Defense
OSHA: Occupational Safety and Health Administration
PA: Pollution abatement
PAPA: Pollution Abatement and Prevention Analysis
PCB: Polychlorinated biphenyl
PCR: Pollution Control Report
PEO: Program Executive Officer
PERSEUS: Planning Environmental Resource Strategy Evolution and Utilization Study
PL: Public Law
PM: Project Manager
POC: Point of Contact
POL: Petroleum, Oil, and Lubricants
POM: Program Objective Memorandum
POTW: Publicly Owned Treatment Works
PPA: Pollution Prevention Act
PPO: P2 Opportunity
PPOA: Pollution Prevention Opportunity Assessment
PWC: Public Works Center
PWD: Public Works Department
P2: Pollution Prevention
QA/QC: Quality Assurance/Quality Control
QRP: Qualified recycling program
RCRA: Resource Conservation and Recovery Act
R&D: Research and Development

RDT&E: Research, Development, Test, and Evaluation
RECs: Regional Environmental Coordinators
SAF/AQ: Assistant Secretary of the Air Force for Acquisition
SAF/MI: Assist. Sec. of the Air Force for Manpower, Reserve Affairs, Installations, and Environ.
SARA: Superfund Amendments and Reauthorization Act
SDWA: Safe Drinking Water Act
SECDEF: Secretary of Defense
SECNAV: Secretary of the Navy
SECNAVINST: SECNAV Instruction
SIC: Subject Identification Code
SoT: Statement of Tasks
SPCC Plan: Spill Prevention Control and Countermeasure Plan
SWDA: Solid Waste Disposal Act
TCLP: Toxicity Characteristics Leaching Procedure
TRADOC: Training and Doctrine Command (Army)
TRI: Toxics Release Inventory
TSCA: Toxic Substances Control Act
USAF: United States Air Force
U.S.C.: United States Code
UST: Underground Storage Tank
VOCs: Volatile Organic Compounds

Glossary of Terms

Authorized Use List (AUL) - The list of all hazardous material (HM) that is required to support the requirements of a command or facility.

Environmentally preferable - means products or services that have a less or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product or service.

Facility - All buildings, equipment, structures, and other stationary items that are located on a single site or on contiguous or adjacent sites and which are owned or operated by the same person (or by any person that control, is controlled by, or under common control with, such person). In certain cases, facility also includes motor vehicles, rolling stock, and aircraft.

Life-cycle - means concept, design, development, testing, production, deployment, training, maintenance, supply management, distribution, and disposal/demilitarization.

Hazardous Material - means anything that due to its chemical, physical, or biological nature causes safety, public health, or environmental concerns resulting in an elevated level of effort to manage it.

Hazardous Substance - Any substance designated pursuant to the Federal Water Pollution Control Act; any element, compound, mixture, solution, or substance designated pursuant to the Comprehensive Environmental Response, Compensation and Liability Act of 1990; any hazardous waste having the characteristics identified by the Solid Waste Disposal Act; any hazardous air pollutant listed under the Clean Air Act; and those pursuant to the Toxic Substances Control Act.

Hazardous Waste - The term "hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical or infectious characteristics may: cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness and/or; pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Note that State regulations may be more stringent and take precedence over Federal regulations.

Pollution/Pollutants - All non-product outputs, irrespective of any recycling, treatment, or management that may prevent or mitigate releases to the environment.

Pollution Prevention - Source reduction, as defined in the Pollution Prevention Act, and other practices that reduce or eliminate the creation of pollutants through (1) increased efficiency in the use of raw materials, energy, water, or other resources or (2) protection of natural resources by conservation.

Recycled Material - Previously used materials that can be utilized in place of a raw or source material in the manufacturing process. If not so utilized, this material would become waste.

(Glossary of Terms Continued)

Recycling - Using, reusing, or reclaiming materials, and includes processes that regenerate a material or recover a usable product from it.

Source Reduction - Any practice that (1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment prior to recycling, treatment, or disposal; and (2) reduces the hazards to the public health and the environment associated with the release of such substances, pollutants, or contaminants. The term includes equipment or technology modifications, process or procedures modifications, reformulation or redesign of products, substitution of raw materials, and improvements in housekeeping, maintenance, training, or inventory control.

Waste Reduction - means preventing or decreasing the amount of waste being generated through source reduction, recycling, or purchasing recycled and environmentally preferable products.

Waste Reduction Evaluations at Federal Sites (WREAFS) - This program promotes pollution prevention in Federal Agencies through cooperative research, evaluations, and demonstration projects. The purpose of the WREAFS Program is to conduct cooperative research, development, and demonstration projects with other Federal activities. The objectives are to: 1) identify new technologies and techniques for reducing waste primarily from industrial processes used by Federal agencies, and 2) enhance pollution prevention through technology transfer of lessons learned resulting from pollution prevention assessments (PPOAS), source reduction demonstrations and case studies, and joint waste reduction research projects.

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